DYNACOOL
heat exchanger

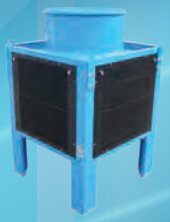
CATALOGUE

49th Edition

Dynacool **DC Airblast Heat Exchangers**

Available in over 30 standard model variants. Made with high performance aluminium cooling elements and heavy duty zinc seal powder coated casings for excellent appearance and durability. Stainless steel casing available on request. Available in most AC voltages, 50 & 60 Hz, hydraulic and air motor drive. Also used for air aftercooling applications. Performance to 9.0 kw/ºC, flows to 800 L/min.

Dynacool **VT Vertical Discharge Tower**



Developed for very large oil cooling applications in high ambient conditions. The VT series are equipped with multiple cooling elements manifolded for parrallel oil flow. Performance to 17 kw/ºC, flows to 1600 L/min.

Versacool **VC Airblast Heat Exchangers**

Available in 6 models with 22 different fan motor variants from AC electric (single or three phase, 50 or 60 Hz and 240 through 450 V), Hydraulic or Air motors. The design delivers more air flow resulting in greater performance using a smaller fan, lower noise and eliminating recycling of heated air through the matrix. Performance to 0.8 kw/ºC, flows to 200 L/min.

Versacool **Mobile Airblast Heat Exchangers**

Available in 6 basic models with 19 different electric motor variants in 12 or 24 volt DC. Proven long life water resistant fan motors in high performance or low amp/noise types. Cooling elements with operating pressure to 14 Bar. Performance to 0.5 kw/ºC, flows to 150 L/min.

Dynacool **ST Steel Core Airblast Heat Exchangers**

Available in 4 models. ST series feature heavy duty cooling elements with steel fins, rectangular steel tanks and copper tubes or elements. ideal for low air side clogging applications or for the special requirements of underground coal mines. Available with standard or antistatic fans and flame proof electric motors for intrinsically safe applications. Performance to 2 kw/ºC, flows to 540 L/min.

Dynacool **Aluminium and Steel Cooling element/cores**

High performance Aluminimium brazed plate elements/cores of oil, air and water cooling applications. Heavy duty open fin elements/cores with either steel or aluminium fins for dirty/dust environments where air side fin clogging is an issue.

Dynacool **HC & B Series Industrial & Marine Shell & Tube Heat Exchangers**

Industrial units for all general oil, air or water cooling applications where a conventional exchanger is required. Marine units available for marine oil cooling or marine jacket water cooling. Special materials such as 90/10 Cu Ni & bronze are used for all surfaces in contact with sea water.

Dynacool **EKM & ECM Extended Surface Shell & Tube Heat Exchangers**

Extended surface tube bundles ensure high heat transfer capacity in small overall size and minimising required water flow. All models now available with “surge relief” mechanism. 90/10 Cu Ni tube materials now standard for stocked range ensuring good service life even if fresh water quality is poor. EKM Performance to 200 kw, Oil flows to 200 L/min. ECM Performance to 400 kw, Oil flows to 700 L/min.

Dynacool **WM High Performance Marine Shell & Tube Heat Exchangers**

Extended surface tube bundle with Stainless Steel tube sheets, 90/10 Cu Ni tubes and stainless steel end bonnets.

Accessories

Thermoswitches for DC or AC motors, thermostatic valves for cold/hot oil flow diversion, cooler mounting brackets, water flow modulating valves & bulb wells to regulate water flow, strainers to minimise foreign material flowing into heat exchanger

CONTENTS

Air Cooled Exchangers With Aluminium Cooling Elements
VERSACOOL SERIES COOLER

- AC electric models deliver more air flow resulting in greater performance while using a smaller diameter lower noise fan. Cylindrical air jet discharge pattern eliminates recycling of heated air through matrix.
- Choice of Hi-Flow low pressure drop cooling elements on all larger models.
- Highest performance in the smallest package allows use in confined spaces, universal top and bottom mount makes vertical, horizontal or inverted mounting easy. Accessory mounting feet (page 64) are available.
- Ease of assembly and commonality of components makes for a large array of models. 73 models are currently available from stock.

For Mounting feet option see page 62
For Temperature Bypass option see page 10
For Thermostat options see page 60-61.

VERSACOOL MODEL CODES

VCL 4 X A C 5 0

VCL= Standard Model Range
VC = Face Mount Range
VCC = Compact Fan Model Range

BASIC MODEL NUMBER = 2, 4, 5, 6, 7 or 8

COOLING ELEMENT TYPE
N = Aluminium Hi-Flow 65mm - Operating pressure 20 Bar (VC5 model only).
X = Aluminium Hi-Flow 65mm - Operating pressure 20 Bar.
P = Aluminium Hi-Flow 65mm - Operating pressure 30 Bar (VC8 model only).

BASIC DRIVE TYPE
A = AC electric motor.
D = DC electric motor.
H = Hydraulic Motor.

SPECIFIC FAN MOTOR CODES
A = (DC motor only) High performance DC electric motor type.
C = (AC models only) Standard Three phase 415 volt TEFC, IP55 electric motor.
D = (AC models only) Standard Single phase 240 volt TEFC, IP55 electric motor.
E = Hydraulic motor MGG Gresen-Tyrone gerotor type, high speed.
F = Hydraulic motor small orbit Eaton J/Sam BGM/ EPMM/Danfoss OMM/etc. 16 mm shaft. **End Ports.**
Q = Hydraulic motor small orbit Eaton J/Sam BGM/ EPMM/Danfoss OMM/etc. 16 mm shaft.
Side Ports (optional)
G = (AC motor only) Three phase 415 volt TEFC, IP55 electric motor. Low speed, low fan noise.
H = (AC motor only) Single phase 240 volt TEFC, IP55 electric motor. Low speed, low fan noise.
M = Commercial Alpha Series M5 Gear Type Hydraulic Motor.
NM = No motor (electric motor mounting provided).
X = Special Hydraulic Motor Mount For Customer Supplied Motor.

DC VOLTAGE OR AC HERTZ ELECTRIC MOTOR CODES
1 = (DC motor only) 12 Volt power supply.
2 = (DC motor only) 24 Volt power supply.
5 = (AC motor only) 50 Hertz AC power supply.
6 = (AC motor only) 60 Hertz AC power supply. Consult sales with voltage before ordering.
Omitted = No Motor Unit.

SPECIAL DETAILS OR FINISH
0= Standard Model. Other numbers indicate special features.
00 = No Motor unit.
F = Aluminium Core Element with extra corrosion resistant finish.
A = Aluminium Core Element anodised with powdercoat top finish.
B504 = Temperature & Pressure Bypass (see page 10).
Accessories are not indicated on model identification. Order separately.

Air Cooled Exchangers With Aluminium Cooling Elements
DYNACOOL SERIES A 2000 CLASSIC

- Australian designed and manufactured product with reputation for quality, reliability and technical excellence.
- With over 30 years experience, constant development and testing has produced the Series A 2000 the most compact and lowest noise oil cooler in its performance range.
- The largest air cooled heat exchanger inventory in the southern hemisphere means that you can demand and receive the fastest delivery of new units and service parts exactly when you need them.

DYNACOOL MODEL CODES

D C 32 Y H 8 AC 6 00 #

BASIC MODEL NUMBER = 31, 32, 33, 35 & 70

COOLING ELEMENT TYPE
S = Hi-Flow 90mm - Operating pressure 20 Bar (Ports on opposite side).
G = Hi-Flow 70mm - Operating pressure 20 Bar (Ports on same side).
L = Hi-Flow 95mm - Operating pressure 20 Bar (Ports on same side).
U = Hi-Flow 95mm - Operating pressure 14 Bar (Ports on opposite side).
V = Hi-Flow 95mm - Operating pressure 20 Bar (Ports on same side).
Y = Hi-Flow 65mm - Operating pressure 20 Bar (Ports on opposite side) Except DC35Y.

PORT ORIENTATION
H = Horizontal
V = Vertical

FAN DIAMETER (mm)
5 = Ø500
6 = Ø630
8 = Ø800
9 = Ø892
10 = Ø1000

BASIC DRIVE TYPE
AC = 3 Phase electric motor.
AD = 1 Phase electric motor.
DA = DC Motor.
HF = Hydraulic orbit motor with end ports.
HQ = Hydraulic orbit motor with side ports (optional).
HV = Hydraulic vane motor.
HX = No motor (hydraulic motor mounting provided. Customer to specify motor details).
NM = No motor (electric motor mounting provided).
GA = Air motor.

MOTOR/FAN SPEED

2 = 2 Pole	Nom. 2800rpm at 50 Hz
4 = 4 Pole	Nom. 1450rpm at 50 Hz
6 = 6 Pole	Nom. 950rpm at 50 Hz
8 = 8 Pole	Nom. 750rpm at 50 Hz

SPECIAL DETAILS OR FINISH
00 or none = 415V 50Hz.
V = 3.5 Bar bypass valve.
F = Extra corrosion resistant finish.
A = Aluminium Core Element anodised with powdercoat top finish.
GR = Coaxial GR Pump fitted to 3 Phase electric fan motor (see page 26).
HP = Coaxial Haight Pump fitted to 3 Phase electric fan motor (see page 26).
PP = Separate pump/ motor package fitted to cooler.

 # Not all combinations are available or possible.

TECHNICAL SPECIFICATIONS - AC ELECTRIC MODELS

Electric Motor Specifications

- Dynacool A 2000 Series. 50 Hz 3 phase asynchronous to IEC 34-1, B3 mount IP55, Insulation- Class F. Temperature rise- Class B .
- Versacool. 50Hz asynchronous to IEC 34-1, B3 mount IP55, Insulation- Class F. Temperature rise- Class B.
- 60 Hz available with reduction of fan blade angles.

General Construction

- Cooling Elements. Aluminium furnace brazed. Ref. to pages 4 and 5 for element types.
- Casing and Structure. Steel (zinc seal) polyester powder coated. Stainless steel to special order.
- Steel core guards on Dynacool models.
- Coated steel fan guards on all models.
- Fans. Polypropylene GF or Polyamide GF. Antistatic fans available on request.
- Fastenings. Zinc plated. Stainless steel to special order.

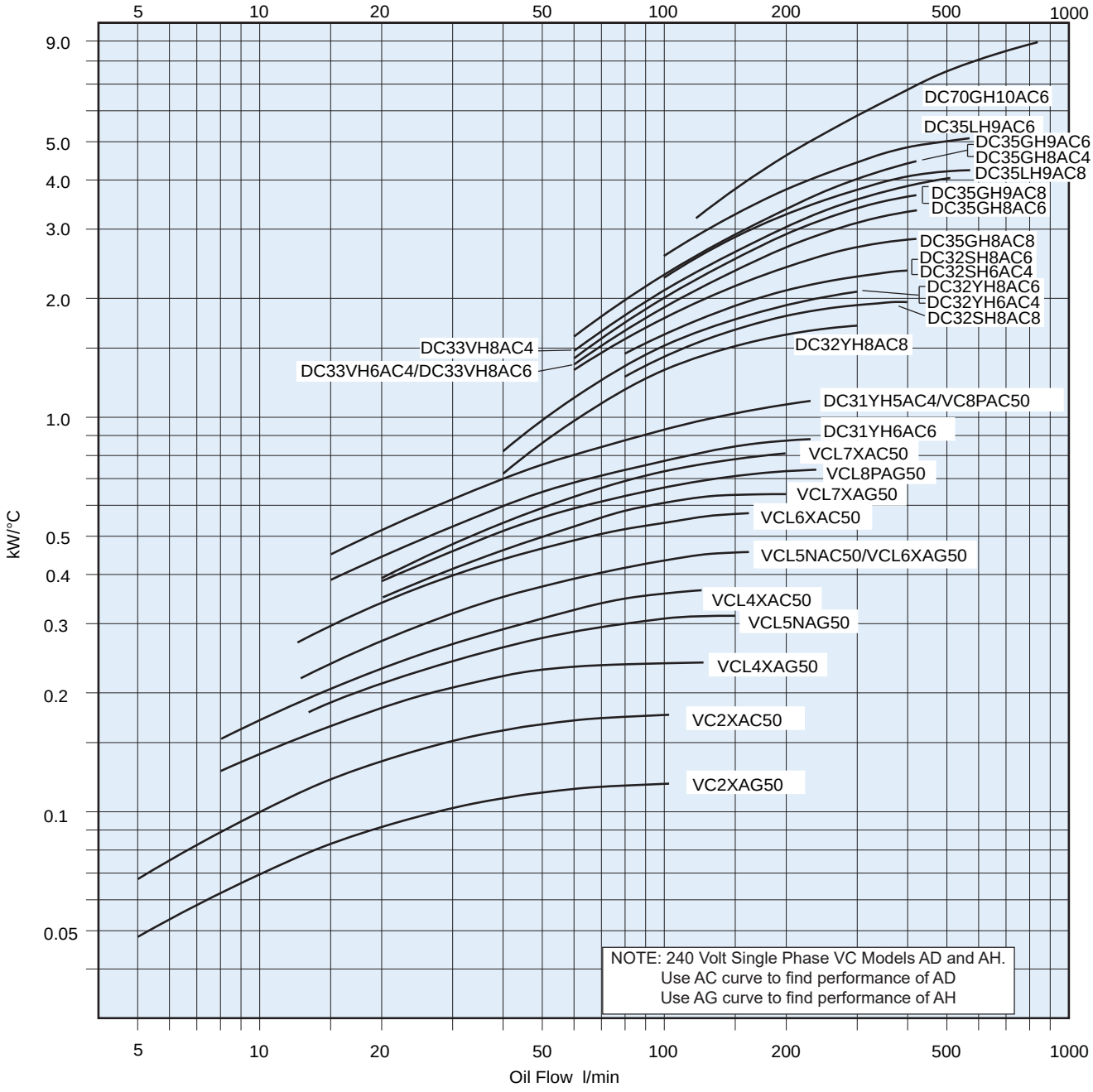
MODEL/ Part Number	Noise level * dB(A) at 1m	Fan Ø (mm)	Volts	Phase	kW	Size	Poles	Weight (kg)	Bypass Option
VC2XAC50	82	243	415	3	0.25	63	2	12	
VC2XAD50	82	243	240	1	0.24	63	2	12	
VC2XAG50	65	243	415	3	0.18	63	4	12	
VC2XAH50	65	243	240	1	0.18	63	4	12	
VCL4XAC50	84	305	415	3	0.37	71	2	20	TP
VCL4XAD50	84	305	240	1	0.37	71	2	20	TP
VCL4XAG50	68	305	415	3	0.37	71	4	20	TP
VCL4XAH50	68	305	240	1	0.37	71	4	20	TP
VCL5NAC50	87	354	415	3	0.75	80	2	30	TP
VCL5NAD50	87	354	240	1	0.75	80	2	30	TP
VCL5NAG50	71	354	415	3	0.37	71	4	26	TP
VCL5NAH50	71	354	240	1	0.37	71	4	26	TP
VCL6XAC50	78	450	415	3	0.55	80	4	37	TP
VCL6XAD50	78	450	240	1	0.55	80	4	37	TP
VCL6XAG50	68	450	415	3	0.55	80	6	39	TP
VCL7XAC50	78	450	415	3	0.55	80	4	39	TP
VCL7XAD50	78	450	240	1	0.55	80	4	39	TP
VCL7XAG50	68	450	415	3	0.55	80	6	41	TP
VCL8PAC50	90	354	415	3	0.75	80	2	69	
VCL8PAD50	90	354	240	1	0.75	80	2	69	
VCL8PAG50	74	354	415	3	0.37	71	4	67	
VCL8PAH50	74	354	240	1	0.37	71	4	67	
DC31YH5AC400	84	500	415	3	0.75	80	4	68	
DC31YH6AC600	78	630	415	3	1.1	90	6	83	
DC32YH6AC400	89	630	415	3	1.5	90L	4	90	
DC32YH8AC600	84	800	415	3	2.2	112	6	91	
DC32YH8AC800	79	800	415	3	1.1	100	8	91	
DC32SH6AC400	89	630	415	3	1.5	90L	4	90	
DC32SH8AC600	88	800	415	3	2.2	112	6	99	
DC32SH8AC800	79	800	415	3	1.1	100	8	99	
DC33VH6AC400	89	630	415	3	1.5	90L	4	180	
DC33VH8AC400	96	800	415	3	3.0	100	4	180	
DC33VH8AC600	87	800	415	3	2.2	112	6	180	
DC35GH8AC400	96	800	415	3	3.0	100	4	195	
DC35GH8AC600	87	800	415	3	2.2	112	6	195	
DC35GH8AC800	79	800	415	3	1.1	100	8	195	
DC35GH9AC600	92	892	415	3	2.2	112	6	195	
DC35GH9AC800	85	892	415	3	1.1	100	8	195	
DC35LH9AC600	92	892	415	3	2.2	112	6	210	
DC35LH9AC800	85	892	415	3	1.1	100	8	210	
DC70GH10AC600	85	1000	415	3	5.5	132M	6	380	

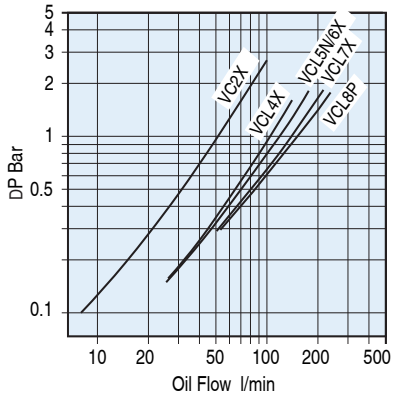
Bypass Option
TP = Temperature and pressure bypass available.

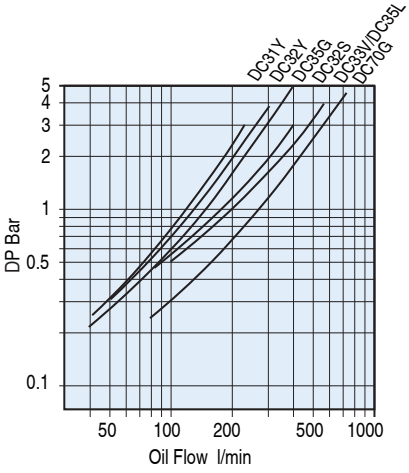
* Noise levels listed are raw A weighted pressure representing worst case. Refer noise level statement page 69.

Air Cooled Exchangers With Aluminium Cooling Elements

PERFORMANCE - STANDARD & HIFLOW AC ELECTRIC MODELS







OIL COOLER SIZING

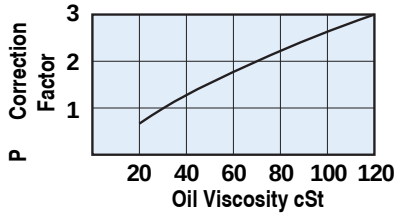
Step 1. Calculate ETD = T_{Oil} - T_{Air}
T_{Oil}= Temp °C of oil entering the cooler (usually the same as max. allowable oil temp.) T_{Air}= Expected Ambient Air Temp°C.

Step 2. Calculate kW/°C ETD = $\frac{kW}{ETD}$ kW = Heat Load.

Step 3. Enter Cooler Performance Tables and select a cooler which meets or exceeds the required performance at the required oil flow rate.

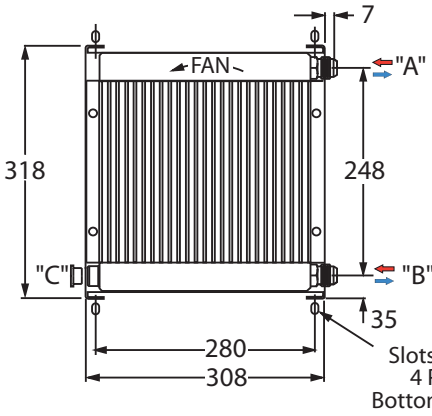
Step 4. Check pressure drop of the oil cooler selected in step 3. If the average oil viscosity is not 30 cSt apply a correction for the expected viscosity.

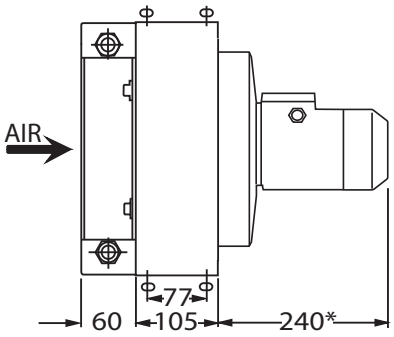
Computer model selection program available.



Air Cooled Exchangers With Aluminium Cooling Elements
DIMENSIONS - VERSACOOL AC ELECTRIC SERIES

MODEL VC2XA



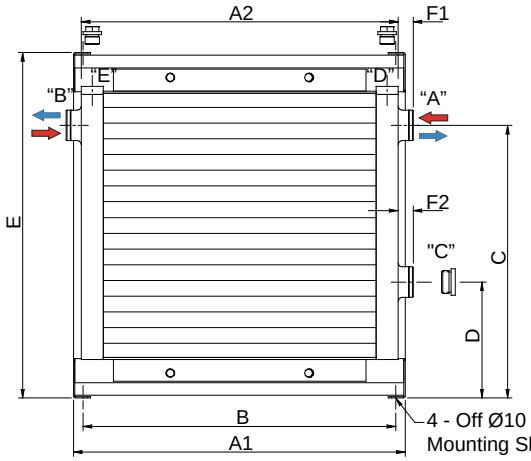


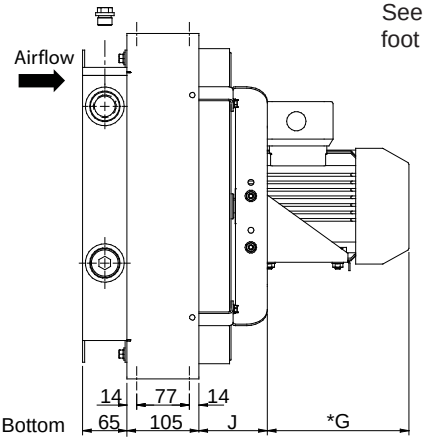
VC2XA Port size

"A"	"B"	"C"
1 1/16"	1 1/16"	1/2"

Flexible hose required
Ports A & B are Male JIC 37° flare UN. Port C is BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.
See Accessory information for foot bracket options.

MODEL VCL4XA, VCL5NA, VCL6XA & VCL7XA





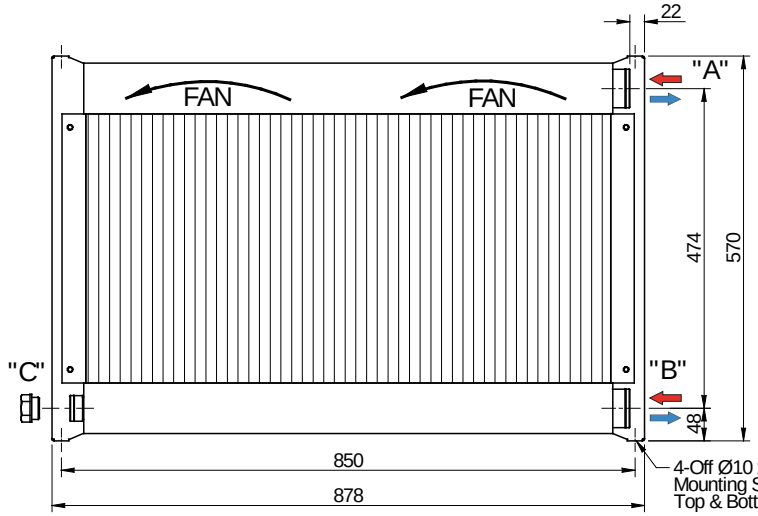
See Accessory information for foot bracket, thermoswitch and bypass valve options.

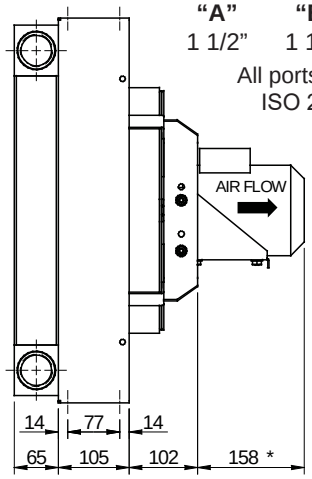
Model	A1	A2	B	C	D	E	F1	F2	G*	J	Liq Vol L	"A"	"B"	"C"	"D"	"E"
VCL4XA	340	330	312	259	99	360	22	22	170	90	1.2	1"	1"	1"	1/2"	1/2"
VCL5NA	440	400	412	333	105	440	22	22	207	102	1.8	1"	1"	1"	1/2"	1/2"
VCL6XA	485	463	457	398	170	505	22	22	207	102	2.2	1"	1"	1"	1/2"	1/2"
VCL7XA	567	543	539	478	173	584	24	19	207	102	2.5	1 1/4"	1 1/4"	3/4"	1/2"	1/2"

*Nominal, Varies with motor brand.

All ports BSPP to ISO 228/1G.

MODEL VCL8PA - ELEMENTS MAX OPERATING PRESSURE 30 BAR - TWIN FAN MODEL





VC8PA Port size

"A"	"B"	"C"
1 1/2"	1 1/2"	3/4"

All ports BSPP to ISO 228/1G.

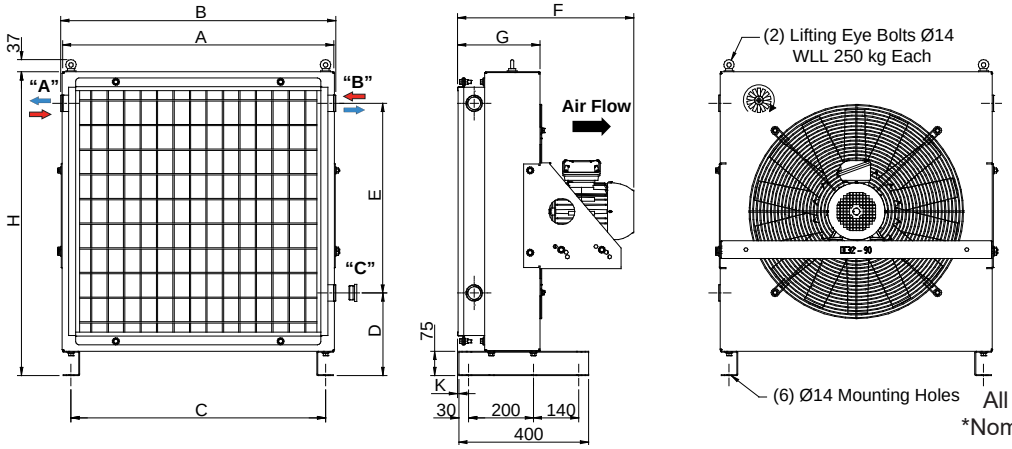
See Accessory information for foot bracket options.

*Nominal, Varies with motor brand.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
DIMENSIONS - DYNACOOL SERIES A 2000 CLASSIC AC ELECTRIC

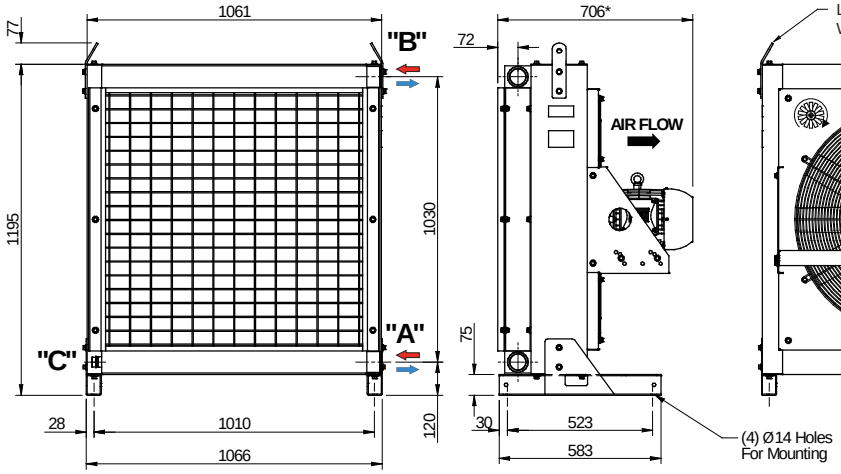
MODEL DC31 & DC32



All ports BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.

Model	A	B	C	D	E	F*	G	H	K	"A"	"B"	"C"
31Y	673	683	619	252	406	500*	254	760	4	1 1/4"	1 1/4"	1 1/4"
32S	837	848	785	178	663	600*	282	938	32	2"	2"	3/4"
32Y	837	848	785	255	586	544*	254	938	4	1 1/4"	1 1/4"	1 1/4"

MODEL DC33

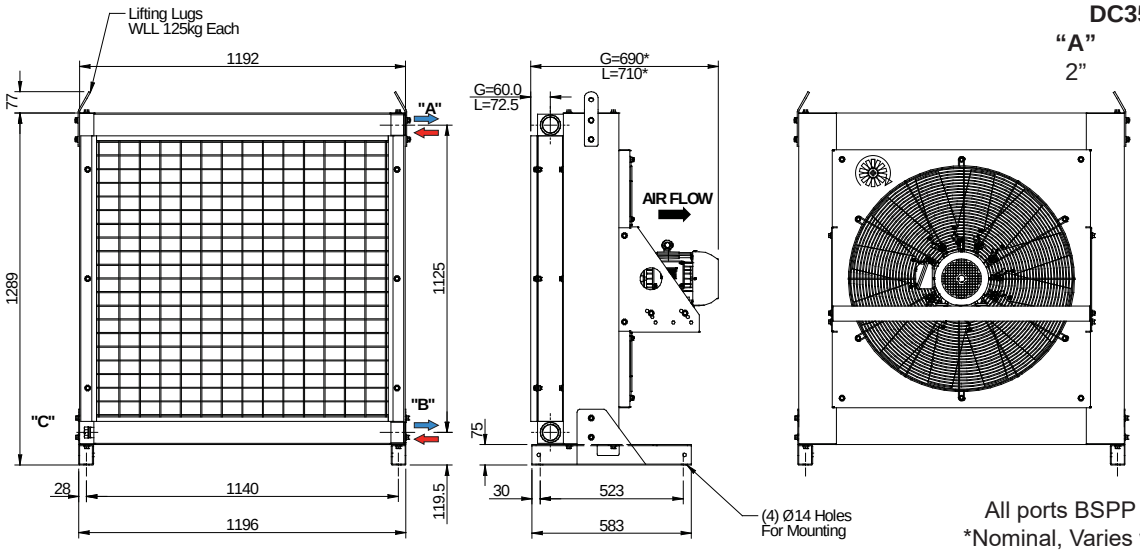


DC33 Port size

"A"	"B"	"C"
2"	2"	3/4"

All ports BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.

MODEL DC35 L & G



DC35 Port size

"A"	"B"	"C"
2"	2"	3/4"

All ports BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
BYPASS OPTION FOR VERSACOOL SERIES

Thermal and pressure bypass system

- The thermal bypass diverts cold oil around the core reducing system pressure and allows the oil to reach optimum temperature sooner. Once warm, the thermal bypass closes and the pressure bypass provides relief if the pressure setting is reached.
- Bolt on design with new style heat exchanger core.
- No loss of core area like some competitors designs.
- Can be placed on either side to suit operational requirements.
- Can be fitted in the field with a suitably equipped core.
- Fits VC4-7 range with all parts standard across the range (cross tube length varies with model).
- Economical, corrosion resistant materials, primarily aluminium alloys.
- Engineered 'O' ring seals at all joints.
- Core and bypass assembly can be retrofitted to older style VC4 -7 heat exchanger case assemblies - see Accessories page 63 for details.

VCL4XAC50B504

Valve Assembly

- Thermal Bypass shift 50°C, full moved at 60°C.
- Pressure bypass 4 BAR.
- Wax Element style thermo-valve.
- Optionally, can be made into pressure or temperature only valve.

AC Voltage Motor Models

Model/ Part No.	Fan Ø (mm)	Volts	Phase	kW	Size	Poles	Weight (kg)	Noise level * dB(A) at 1m
VCL4XAC50B504	305	415	3	0.37	71	2	20	84
VCL4XAD50B504	305	240	1	0.37	71	2	20	84
VCL4XAG50B504	305	415	3	0.25	71	4	20	68
VCL4XAH50B504	305	240	1	0.187	71	4	20	68
VCL5NAC50B504	354	415	3	0.75	80	2	30	87
VCL5NAD50B504	354	240	1	0.75	80	2	30	87
VCL5NAG50B504	354	415	3	0.37	71	4	26	71
VCL5NAH50B504	354	240	1	0.37	71	4	26	71
VCL6XAC50B504	450	415	3	0.55	80	4	37	78
VCL6XAD50B504	450	240	1	0.55	80	4	37	78
VCL6XAG50B504	450	415	3	0.55	80	6	39	68
VCL7XAC50B504	450	415	3	0.55	80	4	39	78
VCL7XAD50B504	450	240	1	0.55	80	4	39	78
VCL7XAG50B504	450	415	3	0.55	80	6	41	68

DC Voltage Motor Models

Model/ Part No.	Fan Ø (mm)	Volts	Amps	Weight kg	Noise level * dB(A) at 1m
VC4XDA10B504	305	12	14.5	11.5	80
VC4XDA20B504	305	24	9.3	11.5	80
VC5NDA10B504	305	12	14.5	14	80
VC5NDA20B504	305	24	9.3	14	80
VC6XDA10B504	305	12	14.5	15.8	80
VC6XDA20B504	305	24	9.3	15.8	80
VC7XDA10B504	2 x 305	12	29	25	83
VC7XDA20B504	2 x 305	24	18.6	25	83

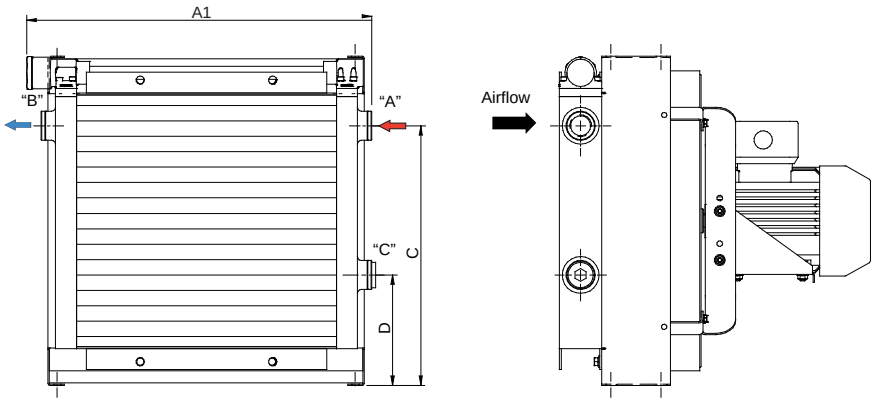
Hydraulic Motor Models

Model/Part No.	Motor type	Motor size cc/rev	Req'd Motor speed rpm	Oil flow req'd l/min	Motor power kW	Weight (kg)	Noise Level* (dBA) at 1m
VCL4XHF12B504	Orbit	8.2	1440	12	0.25	16	68
VCL4XHF19B504	Orbit	12.9	1440	19	0.25	16	68
VCL5NHF12B504	Orbit	8.2	1440	12	0.37	20	71
VCL5NHF19B504	Orbit	12.9	1440	19	0.37	20	71
VCL6XHF12B504	Orbit	8.2	1440	12	0.55	27	78
VCL6XHF19B504	Orbit	12.9	1440	19	0.55	27	78
VCL7XHF12B504	Orbit	8.2	1440	12	0.55	29	78
VCL7XHF19B504	Orbit	12.9	1440	19	0.55	29	78

* Noise levels listed are raw A weighted pressure representing worst case. Refer noise level statement page 69.

Air Cooled Exchangers With Aluminium Cooling Elements
BYPASS OPTION DYNACOOL SERIES A 2000 CLASSIC

MODEL VCL4-7 WITH BYPASS



Model	A1	"A"	"B"	"C"
VCL4XA	396	1"	1"	1"
VCL5NA	466	1"	1"	1"
VCL6XA	529	1"	1"	1"
VCL7XA	611	1 1/4"	1 1/4"	3/4"

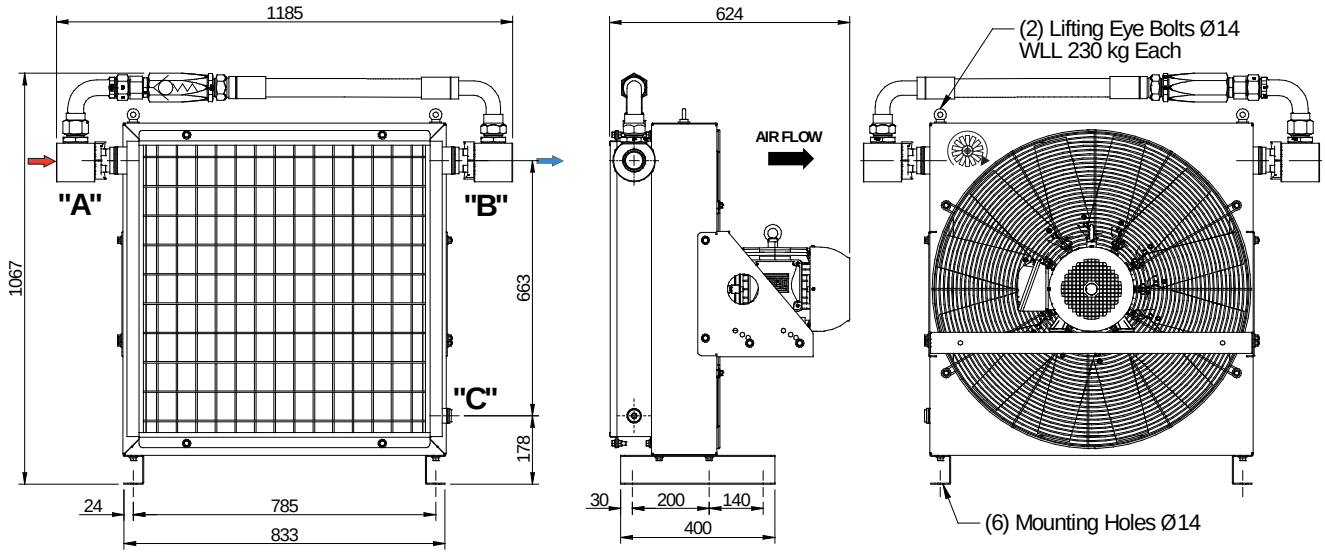
All ports BSPP to ISO 228/1G

For all other dimensions, please refer to preceeding pages.

MODEL DC32S

DC32S Port size

"A"	"B"	"C"
2"	2"	3/4"

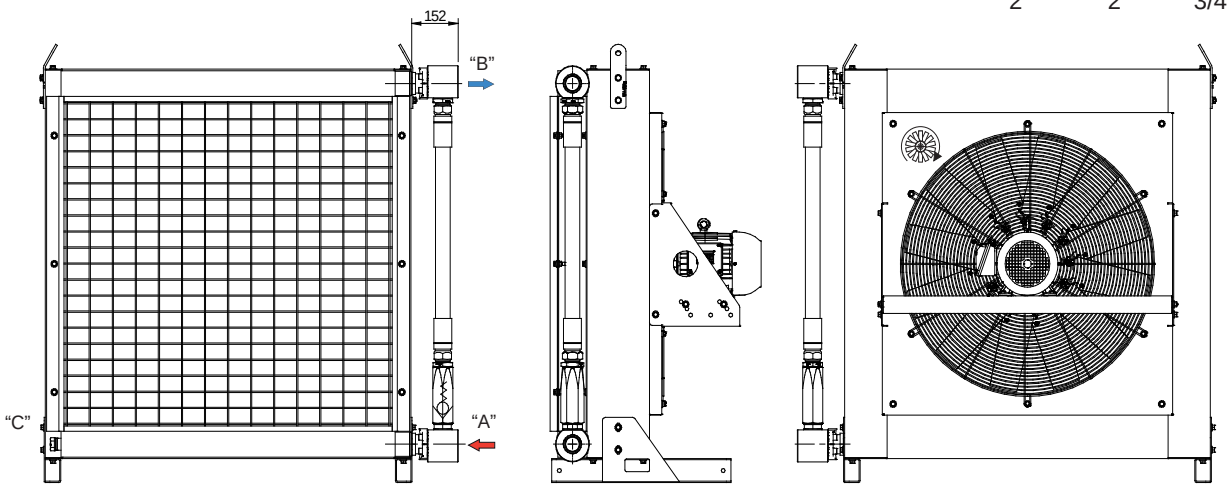


MODELS DC33, DC35 L & G

For all other dimensions, please refer to preceeding pages.

DC33 & 35 Port sizes

"A"	"B"	"C"
2"	2"	3/4"



All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
DC ELECTRIC HEAT EXCHANGERS

- Total of 20 stock models including 12 and 24 volts. DA models are high performance with long life SPAL fans.

- Our Versacool range has the highest performance in the smallest package and allows use in confined spaces. The universal top and bottom mount makes vertical, horizontal or inverted mounting easy. Accessory mounting feet are available. See page 62 for details.

- Can be fitted with optional electric DC thermoswitch kits which control the start of the fan when the oil reaches a predetermined temperature. Kits are available with temperature settings of 55°C and 65°C. Other temperature ranges are available upon request. See pages 62 and 63 for details.

Mounting feet and thermostat options page.

TECHNICAL SPECIFICATIONS - DC ELECTRIC MODELS

Electric Motor Specifications

- Versacool DA Type. High performance, long life, motor enclosure IP68. Temp range -30°C to +80°C.

General Construction

- Cooling Elements. Aluminium furnace brazed.
- Casing. Steel (zinc seal) Polyester powder coated.
- Fans. Polypropylene.
- Fastenings. Zinc plated.

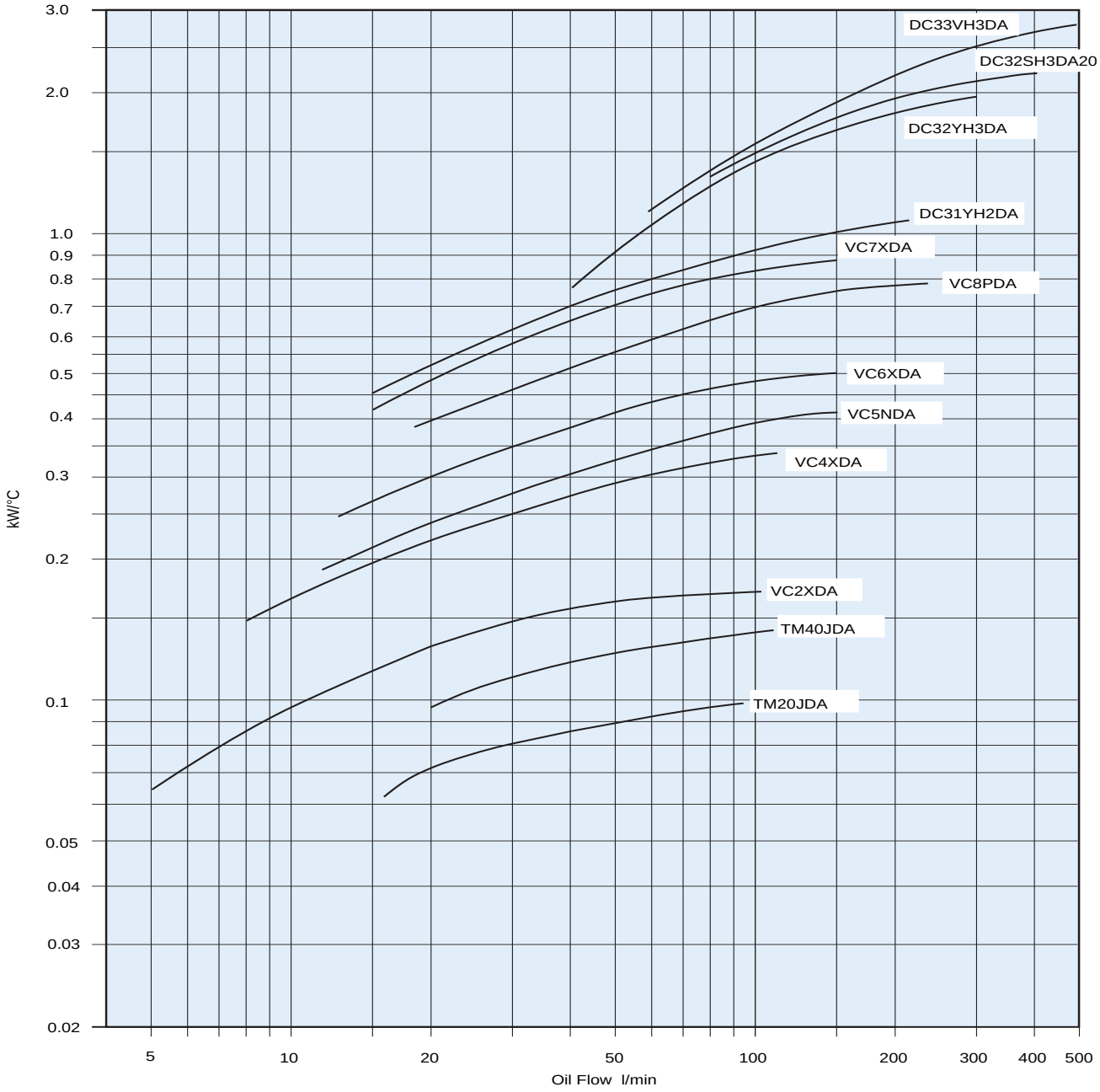
MODEL/ Part Number	Noise level * dB(A) at 1m	Fan Ø (mm)	Volts	Amps	Weight kg	Bypass Option
VC2XDA10	80	254	12	9	8	
VC2XDA20	80	254	24	7.2	8	
VC4XDA10	80	305	12	14.5	11.5	TP
VC4XDA20	80	305	24	9.3	11.5	TP
VC5NDA10	80	305	12	14.5	14	TP
VC5NDA20	80	305	24	9.3	14	TP
VC6XDA10	80	305	12	14.5	15.8	TP
VC6XDA20	80	305	24	9.3	15.8	TP
VC7XDA10	83	2 x 305	12	29	25	TP
VC7XDA20	83	2 x 305	24	18.6	25	TP
VC8PDA10	83	2 x 305	12	29	40	
VC8PDA20	83	2 x 305	24	18.6	40	
DC31YH2DA10	85	4 x 254	12	36	56	
DC31YH2DA20	85	4 x 254	24	29	56	
DC32YH3DA10	90	4 x 305	12	72	90	
DC32YH3DA20	90	4 x 305	24	37	90	
DC32SH3DA20	90	4 x 305	24	37	95	
DC33VH3DA10	90	4 x 305	12	58	142	
DC33VH3DA20	90	4 x 305	24	37	142	

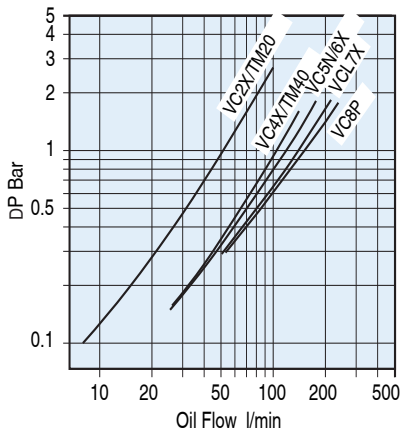
Bypass Option
TP = Temperature and pressure bypass available.

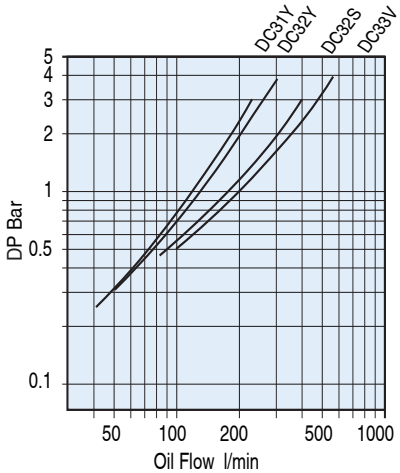
* Noise levels listed are raw A weighted pressure representing worst case. Refer noise level statement page 69.
General Arrangement Drawings of models not shown are available upon request from our Sales Office.

Air Cooled Exchangers With Aluminium Cooling Elements

PERFORMANCE - DC ELECTRIC MODELS







OIL COOLER SIZING

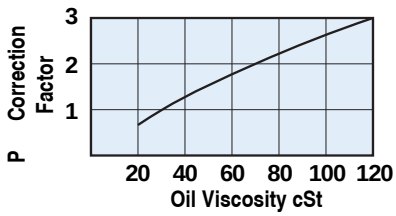
Step 1. Calculate ETD = T_{Oil} - T_{Air}
T_{Oil}= Temp °C of oil entering the cooler (usually the same as max. allowable oil temp.) T_{Air}= Expected Ambient Air Temp°C.

Step 2. Calculate kW/°C ETD = $\frac{kW}{ETD}$ kW = Heat Load.

Step 3. Enter Cooler Performance Tables and select a cooler which meets or exceeds the required performance at the required oil flow rate.

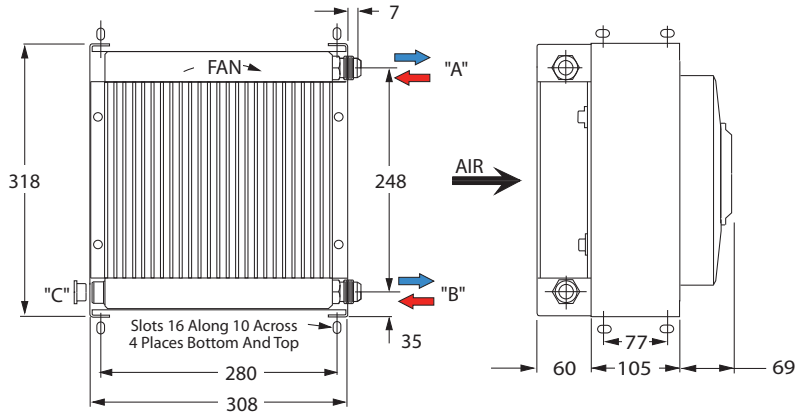
Step 4. Check pressure drop of the oil cooler selected in step 3. If the average oil viscosity is not 30 cSt apply a correction for the expected viscosity.

Computer model selection program available.



Air Cooled Exchangers With Aluminium Cooling Elements
DIMENSIONS - VERSACOOL DC ELECTRIC MODELS

MODEL VC2XD

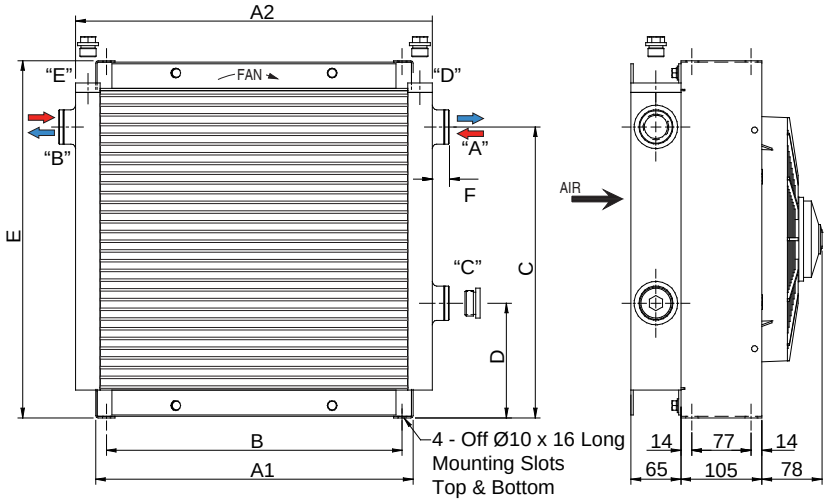


VC2XD Port size

"A"	"B"	"C"
1 1/16"	1 1/16"	1/2"

Flexible hose required
Ports A & B are Male JIC 37° flare UN.
Port C is BSPP to ISO 228/1G.
See Accessory information for
foot bracket and thermoswitch options.

MODEL VC4XD, VC5ND & VC6XD

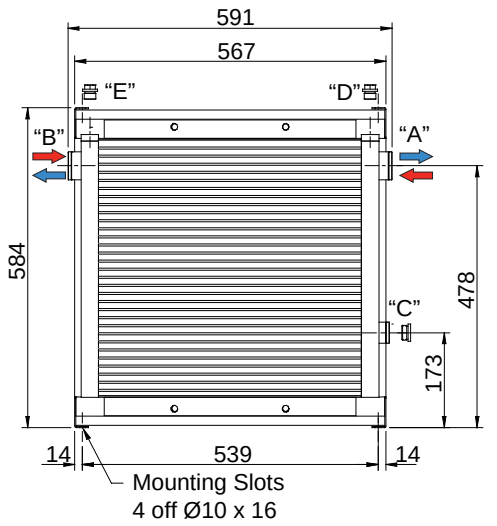


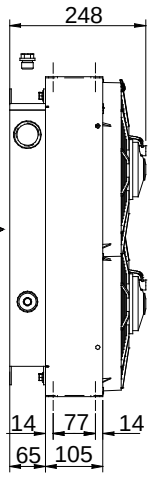
See Accessory information for
foot bracket, thermoswitch and
bypass valve options.

Model	A1	A2	B	C	D	E	F	Liq Vol L	"A"	"B"	"C"	"D"	"E"
VC4XDA	340	330	312	259	99	360	22	1.2	1"	1"	1"	1/2"	1/2"
VC5NDA	440	400	412	333	105	440	22	1.8	1"	1"	1"	1/2"	1/2"
VC6XDA	412	463	384	378	149	464	22	2.2	1"	1"	1"	1/2"	1/2"

All ports BSPP to ISO 228/1G.

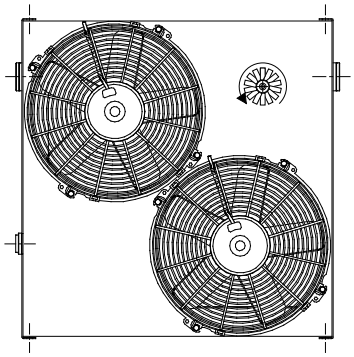
MODEL VC7XDA





VC7XDA Port size

"A"	"B"	"C"	"D"	"E"
1 1/4"	1 1/4"	3/4"	1/2"	1/2"



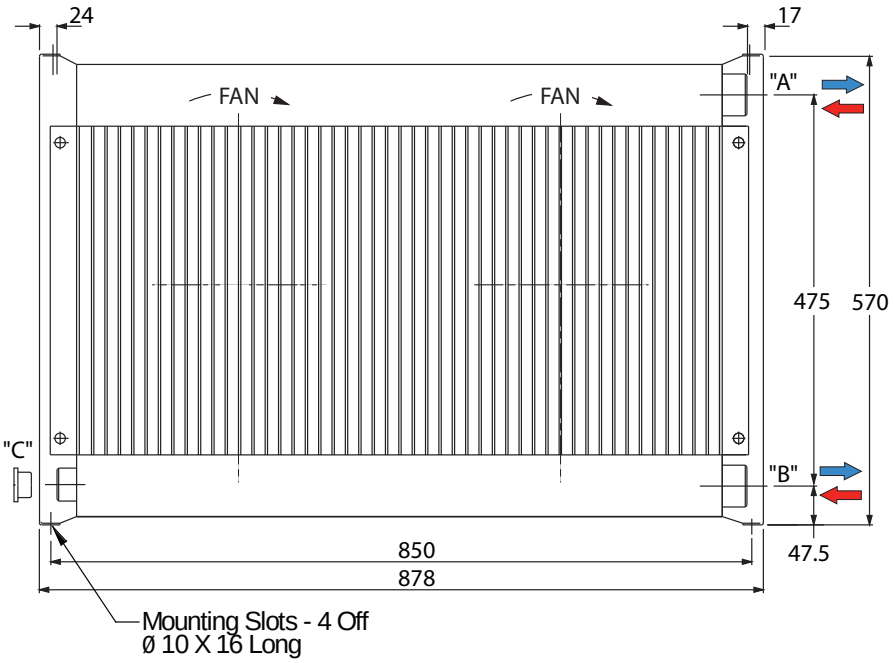
All ports BSPP to ISO 228/1G.
See Accessory information for
foot bracket, thermoswitch and
bypass valve options.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements

DIMENSIONS - DYNACOOL DC ELECTRIC MODELS

MODEL VC8PDA - ELEMENTS MAX OPERATING PRESSURE 30 BAR - TWIN FAN MODEL

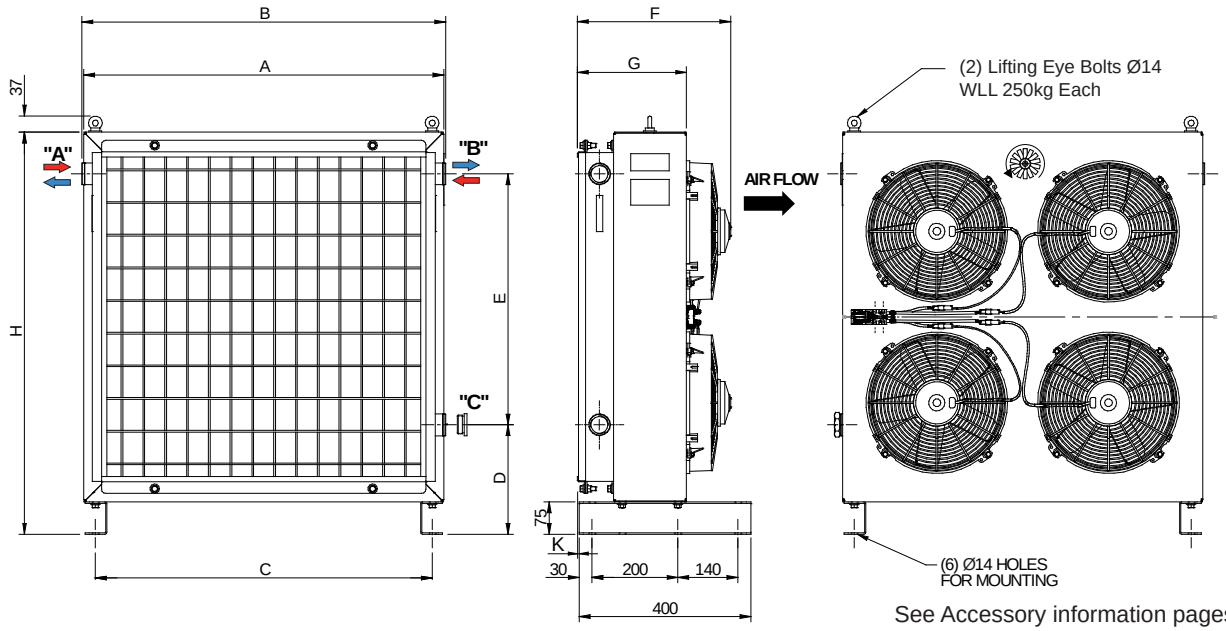


VC8PDA Port size

"A"	"B"	"C"
1 1/2"	1 1/2"	3/4"

All ports BSPP to ISO 228/1G. See Accessory information for foot bracket and thermoswitch options.

MODEL DC31 & 32



See Accessory information pages 62 & 63 for Thermoswitch options.

Model	A	B	C	D	E	F	G	H	K	"A"	"B"	"C"
31Y	673	683	619	252	406	353	254	760	4	1 1/4"	1 1/4"	1 1/4"
32S	837	848	785	178	663	385	282	938	32	2"	2"	3/4"
32Y	837	848	785	255	586	357	254	938	4	1 1/4"	1 1/4"	1 1/4"

All ports BSPP to ISO 228/1G.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

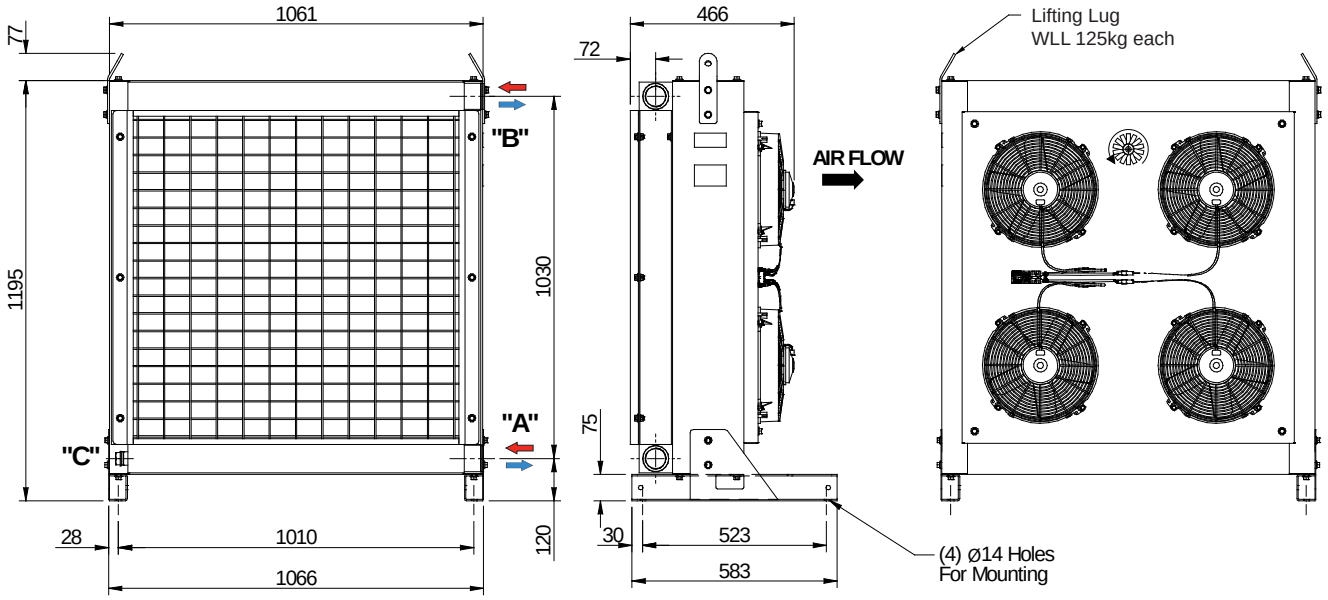
Air Cooled Exchangers With Aluminium Cooling Elements

DIMENSIONS - DYNACOOL DC ELECTRIC MODELS

MODEL DC33

DC33 Port size

"A"	"B"	"C"
2"	2"	3/4"



All ports BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

LOW VOLTAGE REPLACEMENT FANS

HIGH PERFORMANCE AXIAL FLOW FANS

GENERAL DESCRIPTION. These Axial flow low voltage fans are long life high performance fans that can be used for cooling or ventilation on most off road applications. A suitable fuse should be provided to protect the motor.

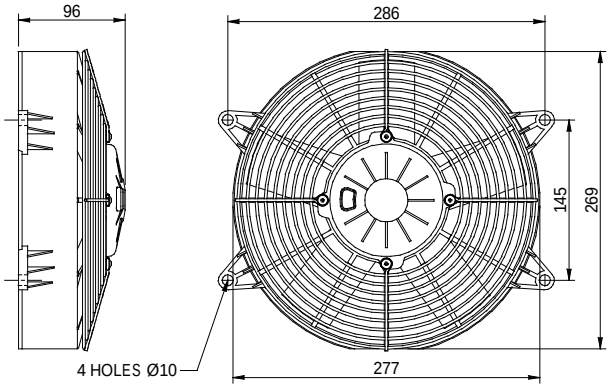
CONSTRUCTION. The blades and shrouds are made of glass filled nylon.

PERFORMANCE RANGE. This range of low voltage fans has improved static pressure performance. Three sizes are available offering flows ranging from 0.21 to 0.8 cubic metres per second.

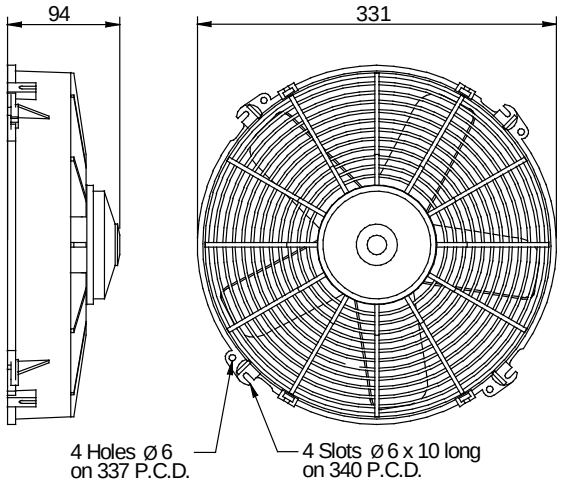
ELECTRIC MOTOR SPECIFICATIONS. The motors used are a high performance long life water/dust resistant type. The models are available for either 12V or 24V DC supply.

PART NUMBER	SERIES	PERFORMANCE. VOLTS	FREE AIR m^3/s	CURRENT (Amps)
039.8.04712	255 (10”)	12	0.52	10.5
039.8.04711	255 (10”)	24	0.54	6.5
039.8.04709	305 (12”)	24	0.8	8.5
039.8.04710	305 (12”)	12	0.76	14.5

SERIES 255



SERIES 305



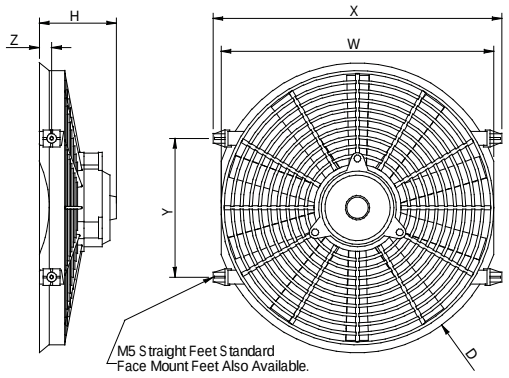
LOW PROFILE AXIAL FANS

GENERAL DESCRIPTION. These Axial flow low voltage fans are a low profile high performance fan that can be used for cooling or ventilation on most off road applications.

CONSTRUCTION. The blades and shrouds are made of glass filled nylon. Straight mount feet are also glass filled nylon with M5 threaded insert. Face mount feet are also available.

PERFORMANCE RANGE. Flow at 0.87 cubic metres per second.

ELECTRIC MOTOR SPECIFICATIONS. The motors used are a high performance water/dust resistant type. The models are available for either 12V or 24V DC supply.



PART NUMBER	SERIES	PERFORMANCE. VOLTS	FREE AIR m^3/s	CURRENT (Amps)	DIMENSIONS. W (mm)	H (mm)	D (mm)	X (mm)	Y (mm)	Z (mm)
67/66991	356 (14”)	12	0.87	12.5	357	100	372	377	180	16
67/66992	356 (14”)	24	0.87	6.3	357	100	372	377	180	16

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

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Air Cooled Heat Exchangers
CUSTOM SOLUTIONS

Special Build Services

At OEM Dynamics, we have the ability to tailor our products to meet the specific needs of our customers, whether it be special build arrangements with controls or sensors to special paint finishes. If you need it special, we can make it happen; whether it's one or a hundred. 3D CAD model prototyping and customer approval drawings are standard.

Some examples of our customised solutions have been.

Twin DC35 models in a special frame. Used in an offshore power pack where there were space constraints.

ST110 model heat exchanger. with dual core arrangement and manifolding.

DC70 model heat exchanger fitted with 3 way thermostatic valve control.

Special Air Delivery Group Arrangements

Versacool model Air Delivery Group fitted to a custom enclosure for air cooling the exterior of a conveyor gearbox.

Replacement fan assemblies fitted to a conveyor drive gearbox output shaft. Split fan and guard enable assembly without removal of other equipment such as conveyor drive couplings.

Oil Cooling Packages

Customised skid mounted cooling units can be manufactured to customer requirements.

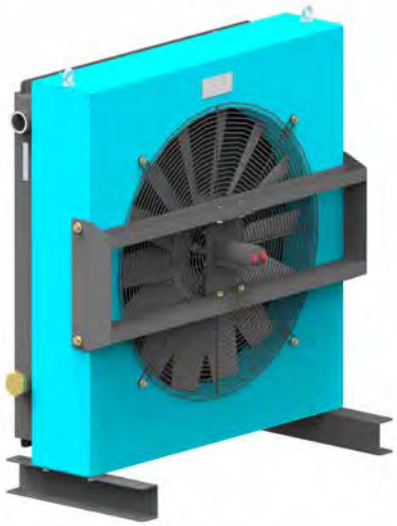
Oil cooling package fitted with shell and tube heat exchangers, oil tank, Haight pump, duplex filter, 3 way thermostatic control. Sensors for oil flow, oil level, oil temperature, oil pressure, oil moisture content and filter condition.

Oil cooling package fitted with ST75 model heat exchanger, Haight pump and duplex filter. Sensors for oil flow, oil temperature, oil pressure and filter condition. Thermostatic control of fan motor.

Air Cooled Exchangers With Aluminium Cooling Elements
HYDRAULIC DRIVE COOLERS

- Hydraulic motor fan drives are available on most Versacool and Dynacool heat exchangers.
- Compact face mount system.
- Hydraulic motor options include either an 8cc or an 12cc mini orbit motor.
- HX coolers available for fitting of customer supplied hydraulic motors. Consult our sales office.
- Overhung load adaptors can be supplied and fitted for plug-in on HX hydraulic motor types.
- For mounting either face up or face down, please consult with our sales office.
- Custom solutions are available such as HX coolers fitted with OHLA's for use with bent axis hydraulic motors.

MINI ORBIT MOTOR



Mounting feet options page 62.

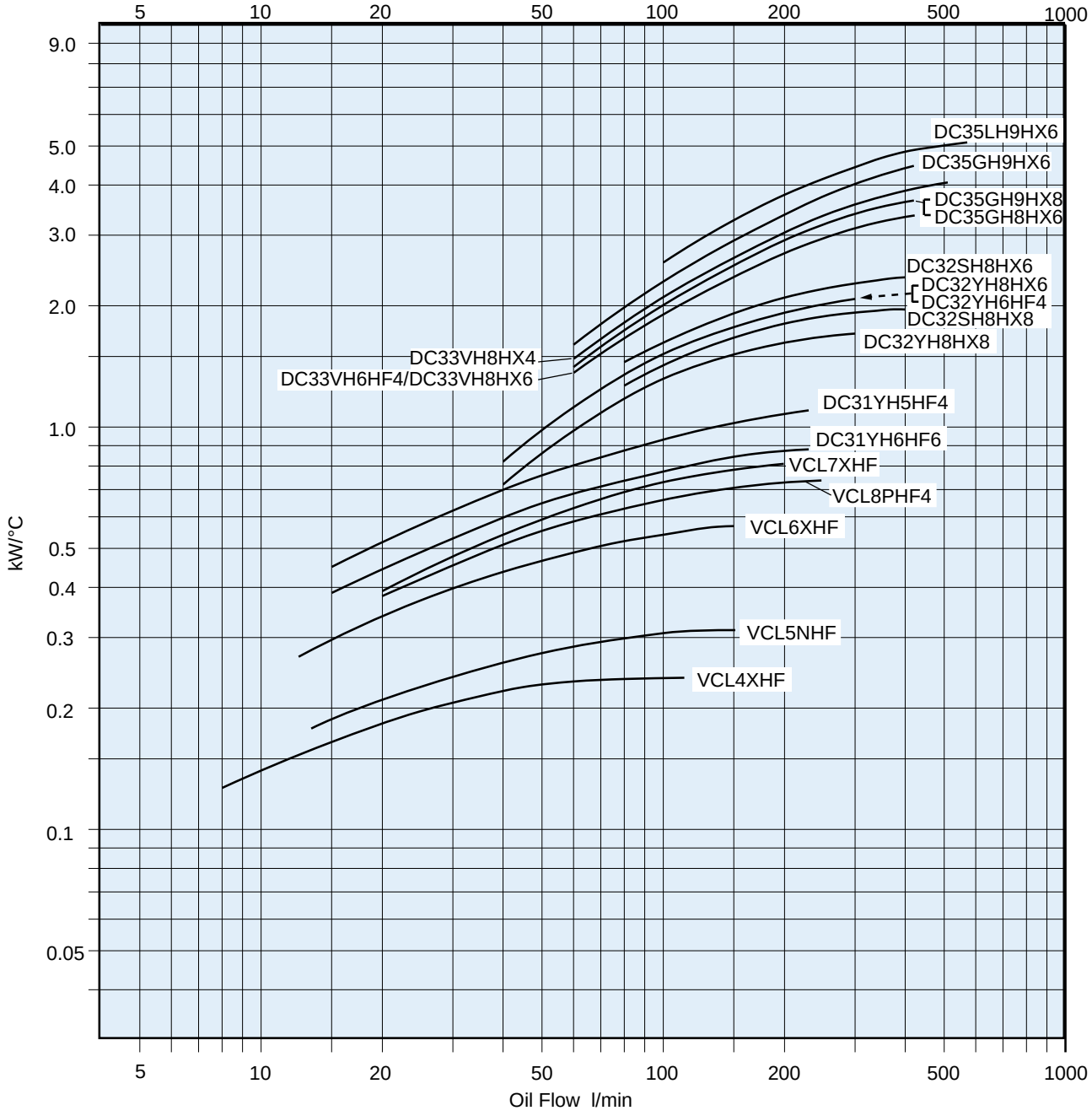
TECHNICAL SPECIFICATIONS - COOLERS WITH HYDRAULIC MOTORS

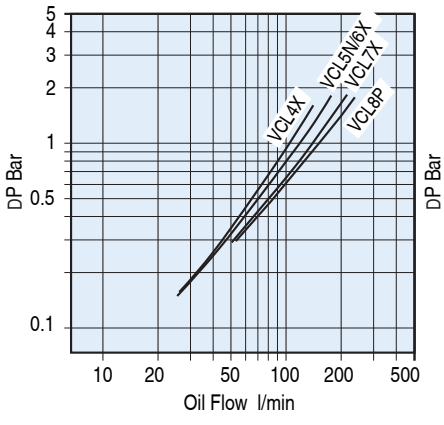
Model	Motor type	Motor size cc/rev	Req'd Motor rpm	Oil flow req'd l/min	Motor power kW	Weight[3] (kg)	Noise Level* (dBA)@1m	Bypass Option
VCL4XHF12/19	Orbit [2]	8.2/12.9	1440	12/19	0.25	16	68	TP
VCL5NHF12/19	Orbit [2]	8.2/12.9	1440	12/19	0.37	20	71	TP
VCL6XHF12/19	Orbit [2]	8.2/12.9	1440	12/19	0.55	27	78	TP
VCL7XHF12/19	Orbit [2]	8.2/12.9	1440	12/19	0.55	29	78	TP
VCL8PHF412/19	2 x Orbit [2]	8.2/12.9	1440	12/19	2 x 0.37	47	74	
DC31YH5HF412/19	Orbit [2]	8.2/12.9	1440	12/19	0.75	55	84	
DC32YH6HF412/19	Orbit [2]	8.2/12.9	1440	12/19	1.5		89	
DC32YH8HX6/8[1]	Cust. supply	-	920/710	-	2.2/1.1		84 / 79	
DC32SH8HX6/8[1]	Cust. supply	-	920/710	-	2.2/1.1		88 / 79	
DC33VH6HF412/19	Orbit [2]	8.2/12.9	1440	12/19	1.5		89	
DC33VH8HX400[1]	Cust. supply	-	1440	-	3.0		96	
DC33VH8HX600[1]	Cust. supply	-	920	-	2.2		87	
DC35GH8HX6/8[1]	Cust. supply	-	920/710	-	2.2/1.1		87 / 79	
DC35GH9HX600[1]	Cust. supply	-	920	-	2.2		92	
DC35LH9HX600[1]	Cust. supply	-	920	-	2.2		92	

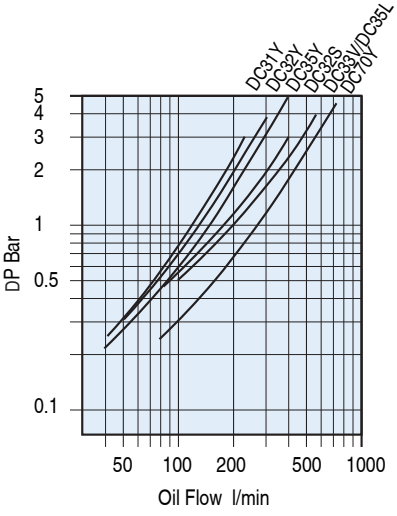
[1] Part number will vary according to customer motor type.
[2] For Heat Exchanger models "HF" & "HQ" fitted with orbit motors. Ports on orbit motors are 3/8" BSPP.
"HF" models are fitted with orbit motors with end ports,
"HQ" models are fitted with orbit motors with side ports.(Optional)
In above table, replace code "HF" with code "HQ" when selecting side port option.
[3] Weight is estimated. Note: "HX" models are weight without customer supplied motor.
Performance curves and noise levels are based on required motor rpm.
* Noise levels listed are raw A weighted pressure representing worst case. Refer noise level statement page 69.
Bypass Option
TP = Temperature and pressure bypass available.

Air Cooled Exchangers With Aluminium Cooling Elements

HYDRAULIC DRIVE COOLERS







OIL COOLER SIZING

Step 1. Calculate ETD = T_{Oil} - T_{Air}

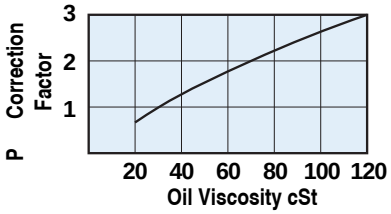
T_{Oil}= Temp °C of oil entering the cooler (usually the same as max. allowable oil temp.) T_{Air}= Expected Ambient Air Temp°C.

Step 2. Calculate kW/°C ETD = $\frac{kW}{ETD}$ kW = Heat Load.

Step 3. Enter Cooler Performance Tables and select a cooler which meets or exceeds the required performance at the required oil flow rate.

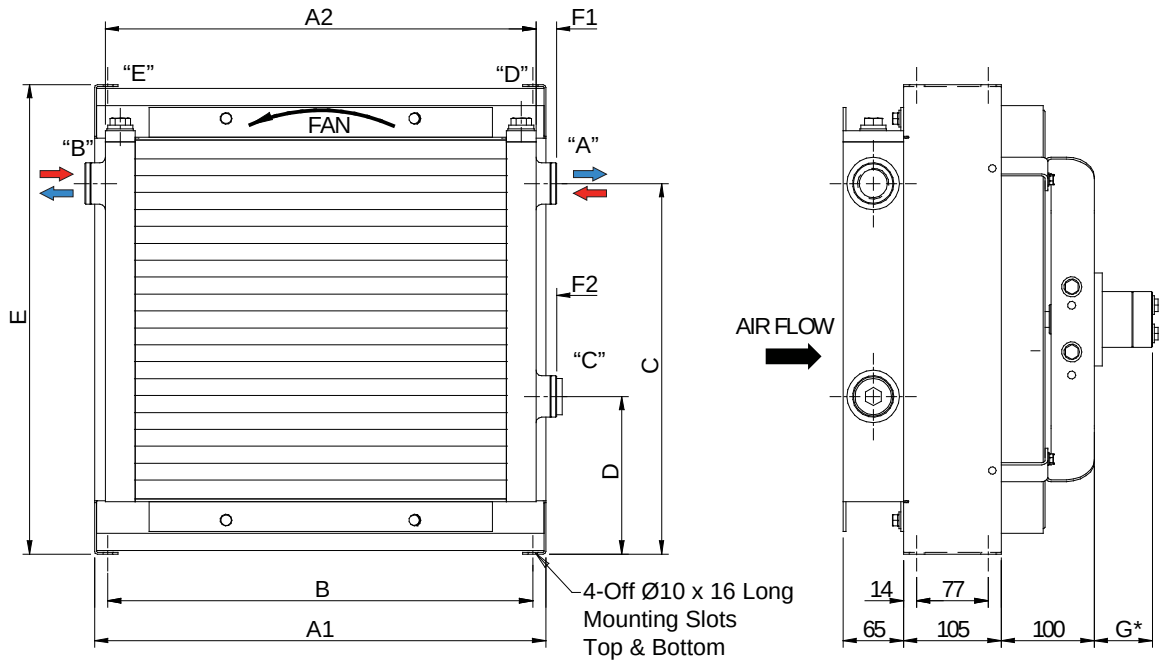
Step 4. Check pressure drop of the oil cooler selected in step 3. If the average oil viscosity is not 30 cSt apply a correction for the expected viscosity.

Computer model selection program available.



Air Cooled Exchangers With Aluminium Cooling Elements
DIMENSIONS - VERSACOOL HYDRAULIC MODELS

MODEL VCL4XHF, VCL5NHF, VC6LXHF & VCL7XHF



See Accessory information for foot bracket and bypass valve options.

*Nominal, Varies with motor type.

Model	A1	A2	B	C	D	E	F1	F2	G*	Liq Vol L	"A"	"B"	"C"	"D"	"E"
VCL4XHF	340	330	312	259	99	360	22	22	71	1.2	1"	1"	1"	1/2"	1/2"
VCL5NHF	440	400	412	333	105	440	22	22	59	1.8	1"	1"	1"	1/2"	1/2"
VCL6XHF	485	463	457	398	170	505	22	22	59	2.2	1"	1"	1"	1/2"	1/2"
VCL7XHF	567	543	539	478	173	584	24	19	59	2.5	1 1/4"	1 1/4"	3/4"	1/2"	1/2"

*Nominal, Varies with motor brand.

All ports BSPP to ISO 228/1G

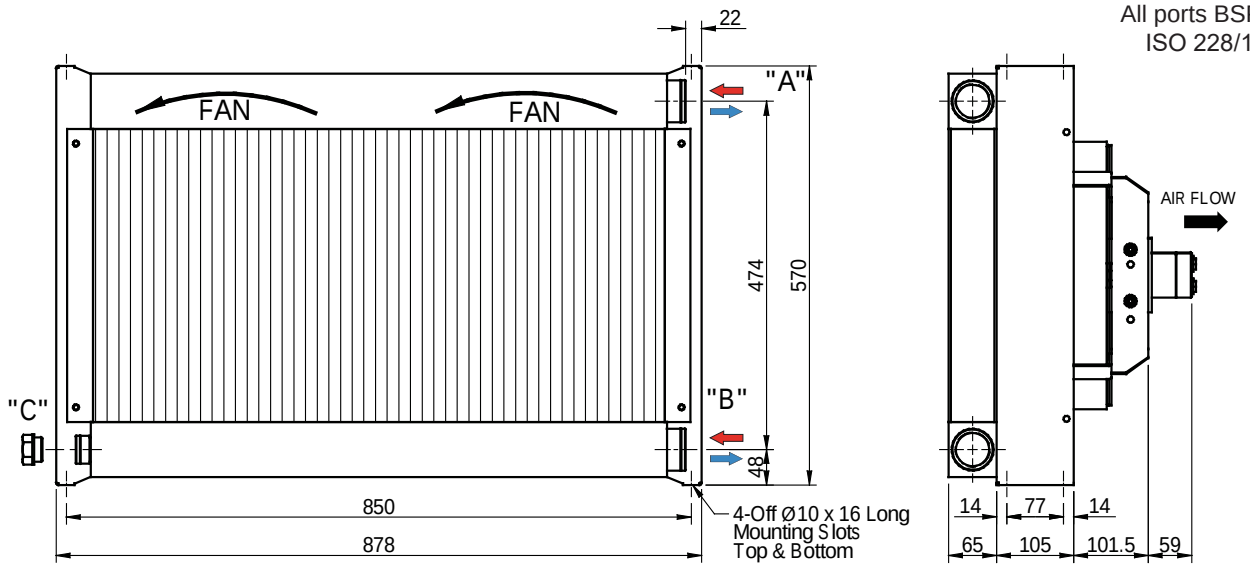
MODEL VCL8XHF4

See Accessory information for foot bracket options.

VC8PA Port size

"A"	"B"	"C"
1 1/2"	1 1/2"	3/4"

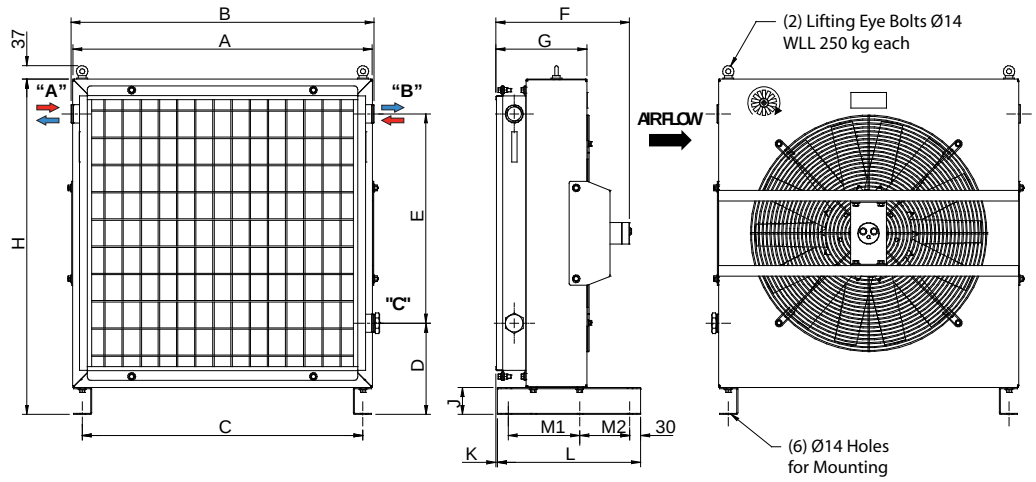
All ports BSPP to ISO 228/1G.



All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
DIMENSIONS - DYNACOOL SERIES A 2000 CLASSIC HYDRAULIC MODELS

MODEL DC31 & DC32

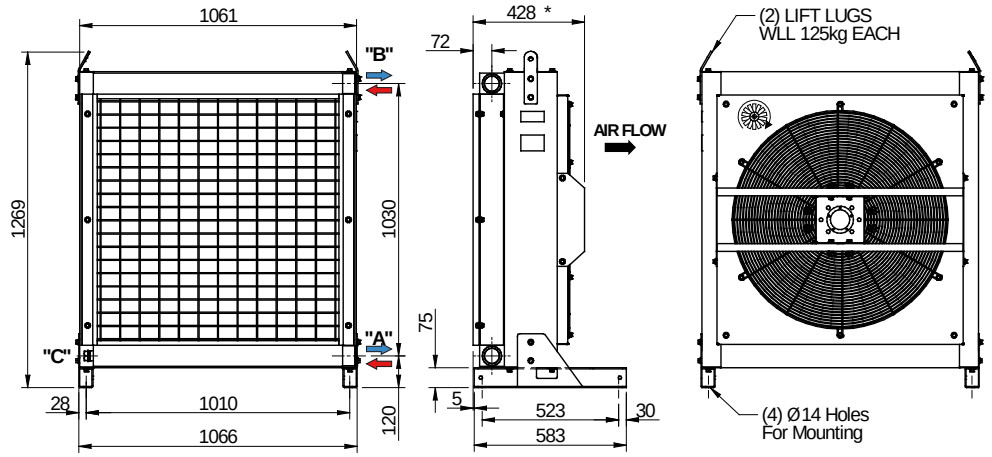


Model	A	B	C	D	E	F*	G	H	K	Port A	Port B	Port C
31Y	673	693	613	254	406	373*	254	760	4	1 1/4”	1 1/4”	1 1/4”
32S	837	882	785	178	663	412*	282	938	22	2”	2”	3/4”
32Y	837	848	785	255	586	374*	254	938	4	1 1/4”	1 1/4”	1 1/4”

*Nominal Varies with motor type.

Ports BSPP to ISO 228/1G.

MODEL DC33



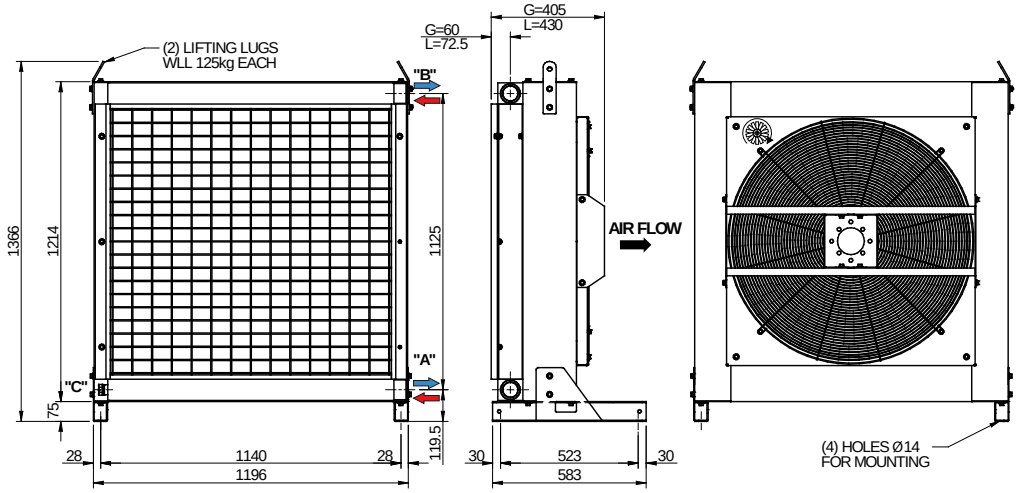
DC33 Port size

“A”	“B”	“C”
2”	2”	3/4”

All ports
BSPP to ISO 228/1G.
*Dimension to motor mounting face.

MODEL DC35 L & G

No Motor model shown. Motor selected to suit application



DC35 Port size

“A”	“B”	“C”
2”	2”	3/4”

All ports
BSPP to ISO 228/1G.
*Dimension to motor mounting face.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
VERTICAL DISCHARGE TOWER TYPES

Features

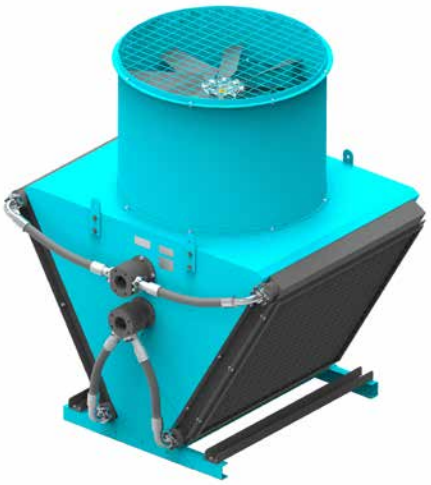
- Series DC70 and VT2042 vertical discharge tower type heat exchangers were developed for use in large oil cooling and air aftercooling applications. The VT series are among the largest capacity standard oil cooling packages available.
- These units feature single fan vertical discharge vane controlled air management systems which reduce noise levels and eliminate re-circulation of heated cooling air. The DC70 has a top mounted motor and fan. On the VT2042, the motor is bottom mounted with a drive shaft to the top mounted fan.
- Both models have a small footprint which means large space saving on big air cooled applications. The VT2042 has a foot print of 1600 mm x 1600 mm and can replace up to 4 of our largest horizontal models.
- For applications where there is a large degree of air contamination, these units can be fitted with ducting to draw clean air into and through the cooling elements and thus eliminate the need to provide expensive air filtration systems. Also, ducting can be fitted to the outlet to discharge hot air outside of the work area.

Series DC70 Performance.

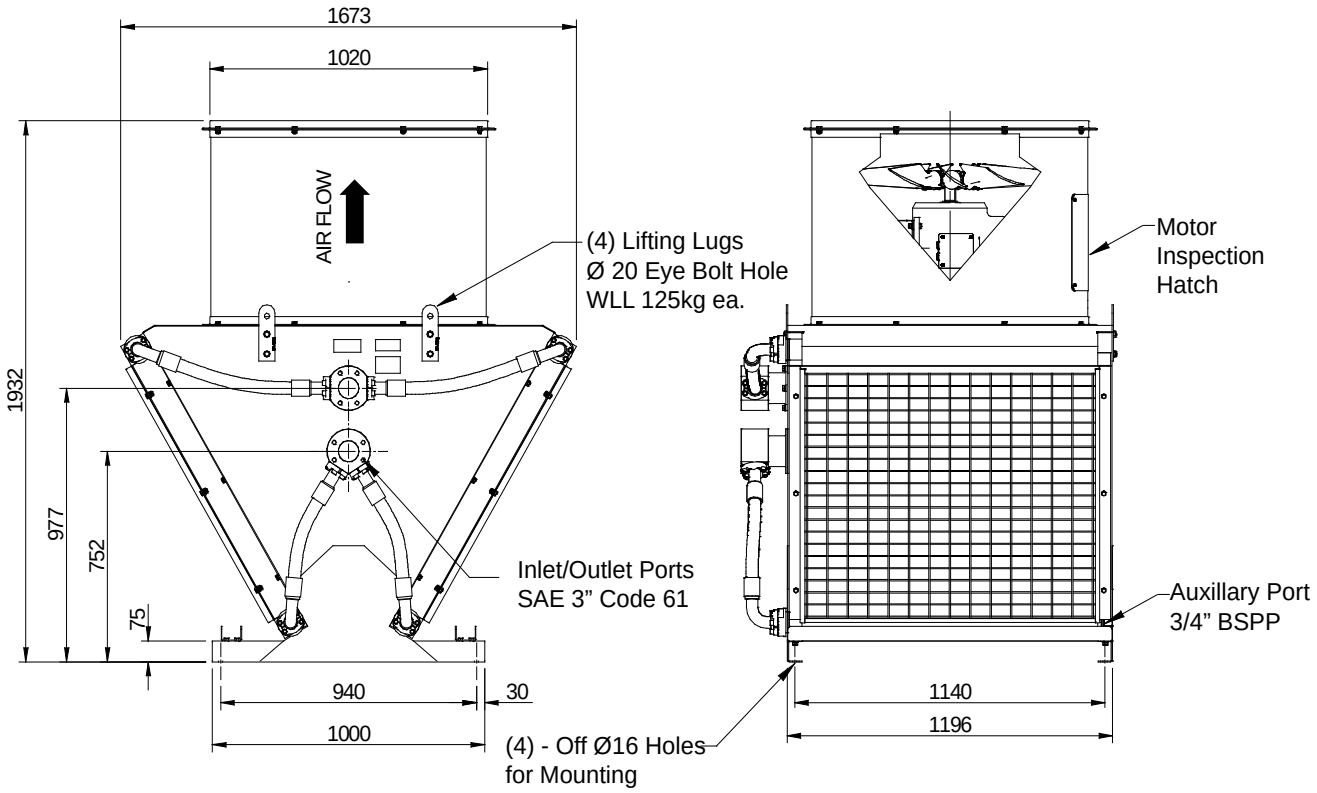
For performance with standard “G” type cooling elements refer to model DC70GH10AC6 page 7. Suitable for compressor air aftercooling up to 2500 SCFM and 14 bar air pressure.

Series DC70 Technical Data.

Refer to model DC70GH10AC6 page 6. Other types are available including units fitted with “L” type cooling elements. Consult sales for details.



DIMENSIONS - SERIES DC 70



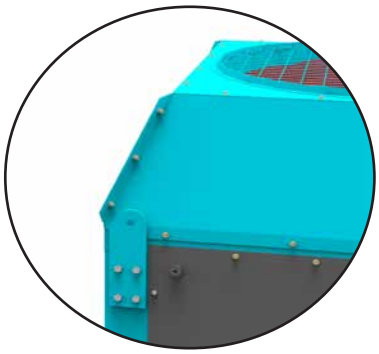
All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Aluminium Cooling Elements
SERIES - VT2042 - VERTICAL DISCHARGE TOWER COOLER

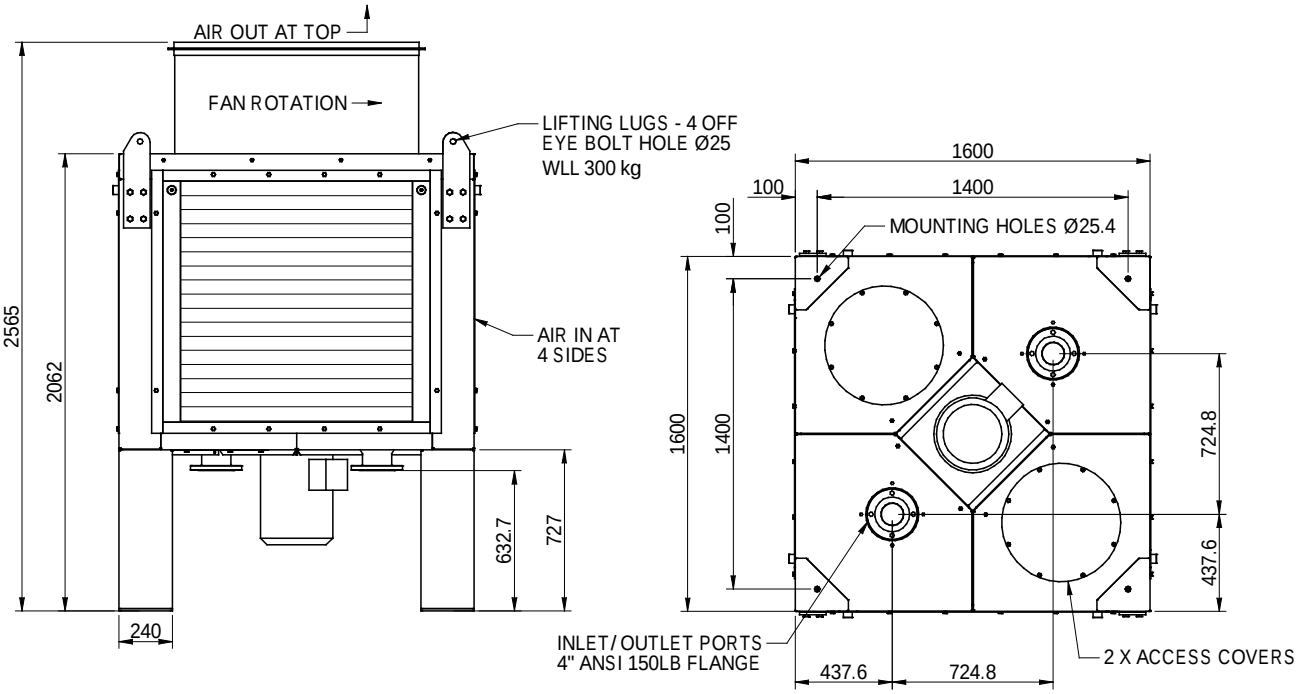
Series VT2042 Performance.
Available in several variants. Performance ranges from 7 to 20kW/°C. Oil Flow ranges from 200 to 2000 L/min. Compressor air aftercooling to 5000 SCFM. Consult sales for details.

Series VT2042 Technical Data.
Available with 6 and 8 pole fan speeds or with variable fan speed control. Electric motor sizes to 30kW. Available with SS sheet metal and customized configurations. For example, unit can be fitted with debris covers and core dust screens.

DIMENSIONS - VT2042



SERIES VT2042



BOTTOM VIEW

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Coaxial pump

- High performance off-line systems for oil cooling of hydraulics or gear drives.
- Heat transfer rating from 0.25 to 2.2 kW/°C using hydraulic or gear oil, contact sales office for suitability with very high viscosity oils.
- Internal relief valve for protection against over pressure or accident.
- New GR coaxial pump units use very low noise aluminium bodied screw pumps with fewer parts and compact design.

APPLICATION. These units are most effective for remote cooling of hydraulic circuits, or lube oil cooling for gear drives.

Where hydraulic circuits are subject to sudden oil flow changes, flow surges and spikes from cylinder operation, there is a high risk of cooler element damage if the cooler is connected into the main circuit. Use of this type of cooler fitted into a remote cooling circuit will avoid this problem. Please contact our sales office to have your application reviewed.

PUMP PRESSURE. Pump delivery pressure to 5 bar. Higher pressure ratings available. Consult factory.

PERFORMANCE RANGE. Heat transfer range is from 0.25 to 2.2 kW/°C of ETD. Performance is based on ISO 68 hydraulic oil at 30cSt, for other fluids and viscosities please contact our sales office. ETD is the difference between the entering oil and the cooling air temperature.

CONNECTION. VCL models are equipped with an oil delivery hose from the oil pump to the cooling element. Please contact our sales office if the pumping head is greater than 10m or you have any special requirements. Pump inlet must be flooded.

OTHER MODELS AVAILABLE. We also supply models with other types of cooling elements for special applications. See page 30 for our ST range fitted with co-axial pumps.

VCL4XAC4GR40

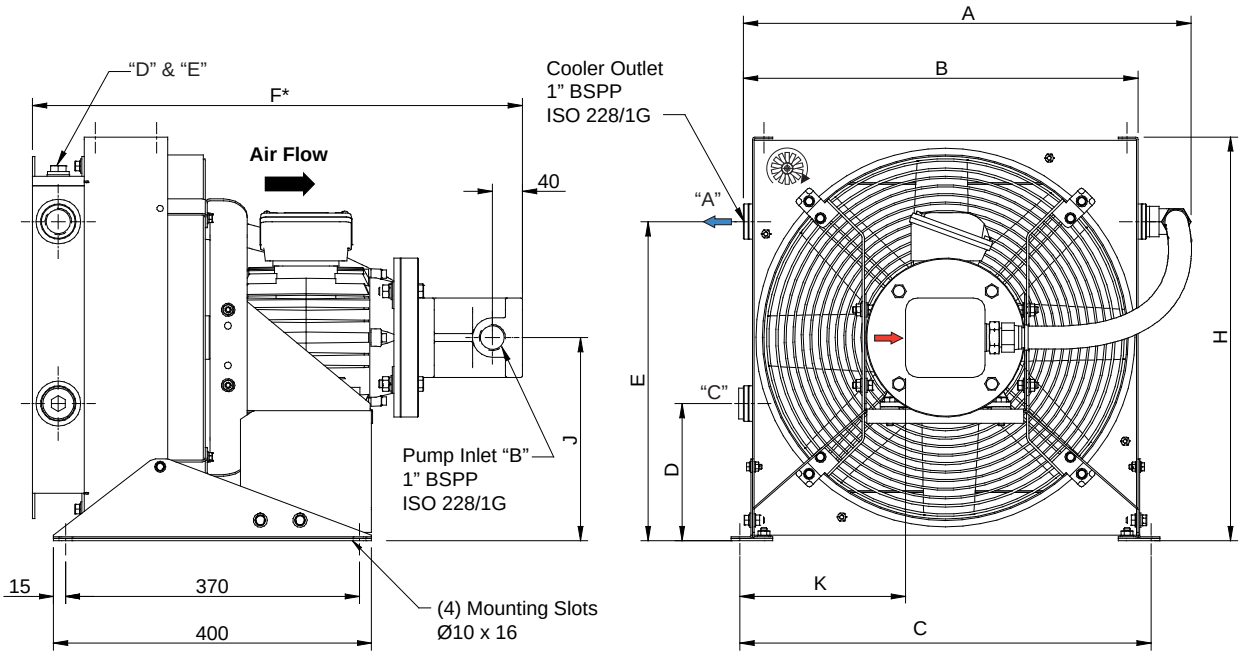
DC32YH6AC4HP125

MODEL Part Number	Oil flow L/min	Pump Type	Max cSt	kW/°C ETD	kW Poles	Volts Phases	Motor Size	Fan Ø (mm)	*Noise Level dB(A) at 1m	Weight (kg)
VCL4XAC4GR40	40	GR40	210	0.25	1.5/4	415	90L	305	71	42
VCL6XAC4GR40	40	GR40	210	0.43	1.5/4	415	90L	450	78	50
VCL6XAC6HP40	40	20UR	435	0.30	1.1/6	415	90L	450	70	69
VCL6XAC4HP60	60	20UR	435	0.51	1.5/4	415	90L	450	78	69
VCL7XAC4GR40	40	GR40	210	0.55	1.5/4	415	90L	450	78	57
VCL7XAC6HP40	40	20UR	435	0.40	1.1/6	415	90L	450	70	81
VCL7XAC4HP60	60	20UR	435	0.62	1.5/4	415	90L	450	78	81
DC31YH5AC4HP40	40	10UR	300	0.70	3.0/4	415	100	500	85	115
DC31YH5AC4HP70	70	24UR	435	0.85	3.0/4	415	100	500	85	126
DC31YH5AC4HP95	95	30UR	435	0.92	3.0/4	415	100	500	85	126
DC32YH6AC4HP70	70	24UR	435	1.25	4.0/4	415	112	630	89	150
DC32YH6AC4HP125	125	40UR	435	1.70	4.0/4	415	112	630	89	150
DC35GH6AC4HP125	125	40UR	435	2.20	4.0/4	415	112	630	96	212

Heat transfer rating kW/°C ETD is for Mineral Oil with operating viscosity less than 100 cSt.

* Noise levels listed are raw A weighted @ 1 metre representing worst case. Refer noise level statement page 69.

MODEL VCL with GR40 Pump

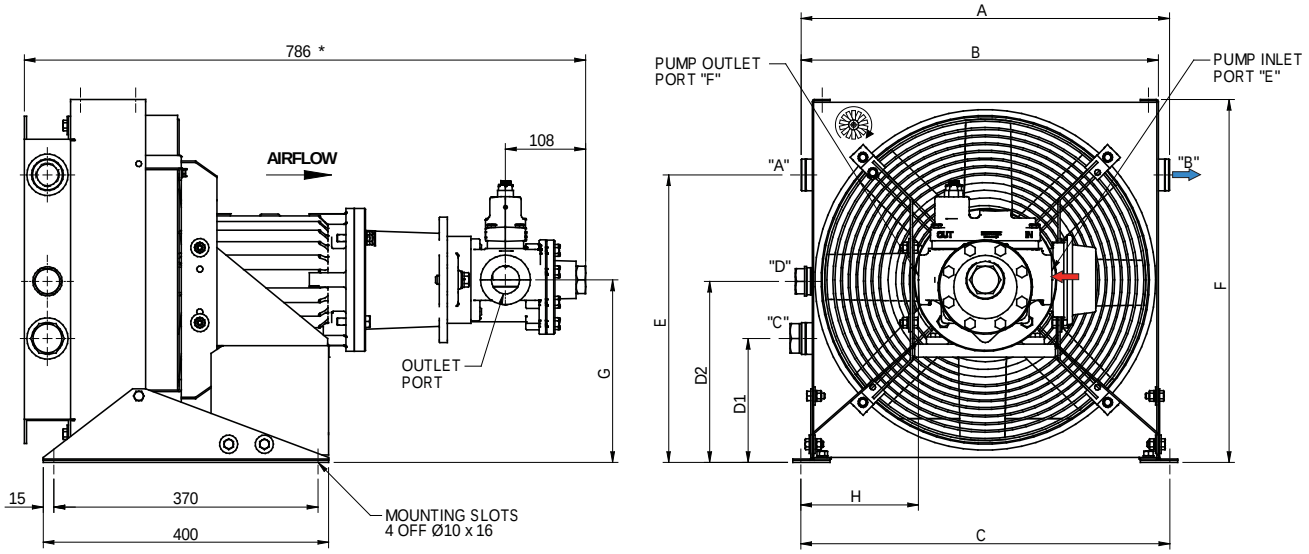


MODEL	A	B	C	D	E	F*	H	J	K	"A"	"B"	"C"	"D"	"E"
VCL4XAC4GR40	430	357	372	102	262	610	363	183	136	1"	1"	1"	1/2"	1/2"
VCL6XAC4GR40	563	496	517	172	402	610	508	256	208	1"	1"	1"	1/2"	1/2"
VCL7XAC4GR40	647	579	599	176	481	610	587	292	249	1 1/4"	1"	3/4"	1/2"	1/2"

* Nominal, varies with motor brand.

Ports BSPP to ISO 228/1G.

MODEL VCL with Haight Pump



MODEL	A	B	C	D1	D2	E	F	G	H	"A"	"B"	"C"	"D"	"E"	"F"
VCL6XAC6HP40	568	508	517	173	253	401	508	256	169	1"	1"	1"	3/4"	1 1/4"	1 1/4"
VCL6XAC4HP60	568	508	517	173	253	401	508	256	169	1"	1"	1"	3/4"	1 1/4"	1 1/4"
VCL7XAC6HP40	647	587	599	175	-	480	587	296	210	1 1/4"	1 1/4"	3/4"	-	1 1/4"	1 1/4"
VCL7XAC4HP60	647	587	599	175	-	480	587	296	210	1 1/4"	1 1/4"	3/4"	-	1 1/4"	1 1/4"

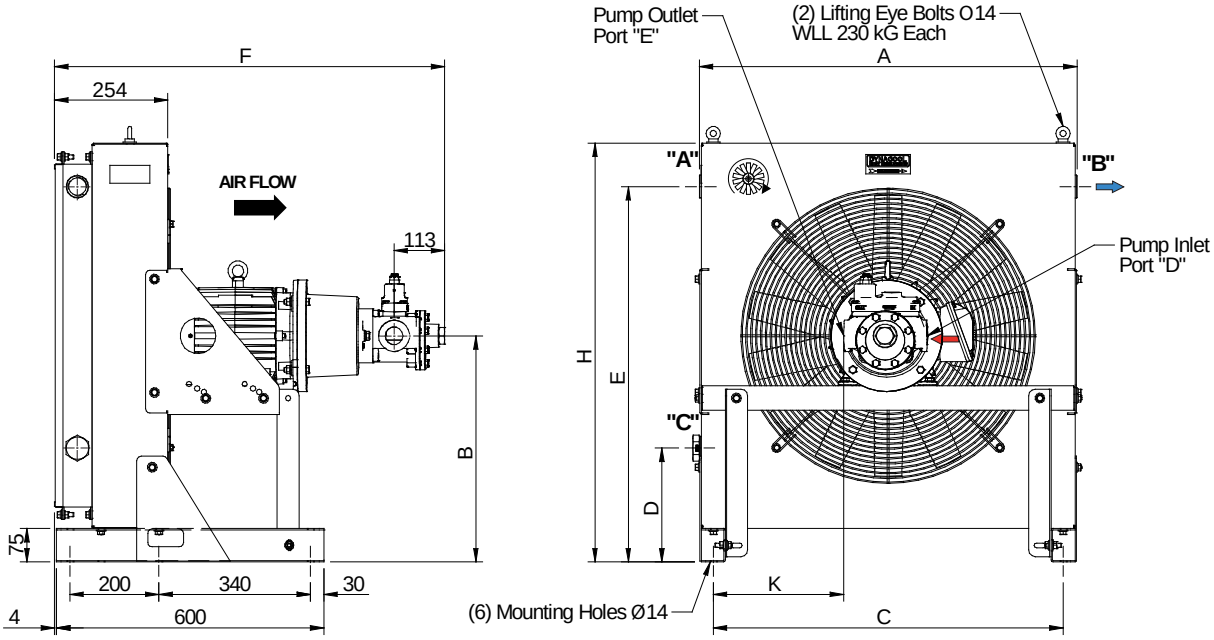
* Nominal, may vary with motor brand.

Heat Exchanger Ports "A" - "D" are BSPP to ISO 228/1G.
Pump Ports "E" - "F" are NPT to ASME B1.20.1

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Air Cooled Exchangers With Coaxial pump
DIMENSIONS - AIR COOLED EXCHANGERS WITH COAXIAL PUMPS

MODEL DC31 & DC32 with Haight Pump

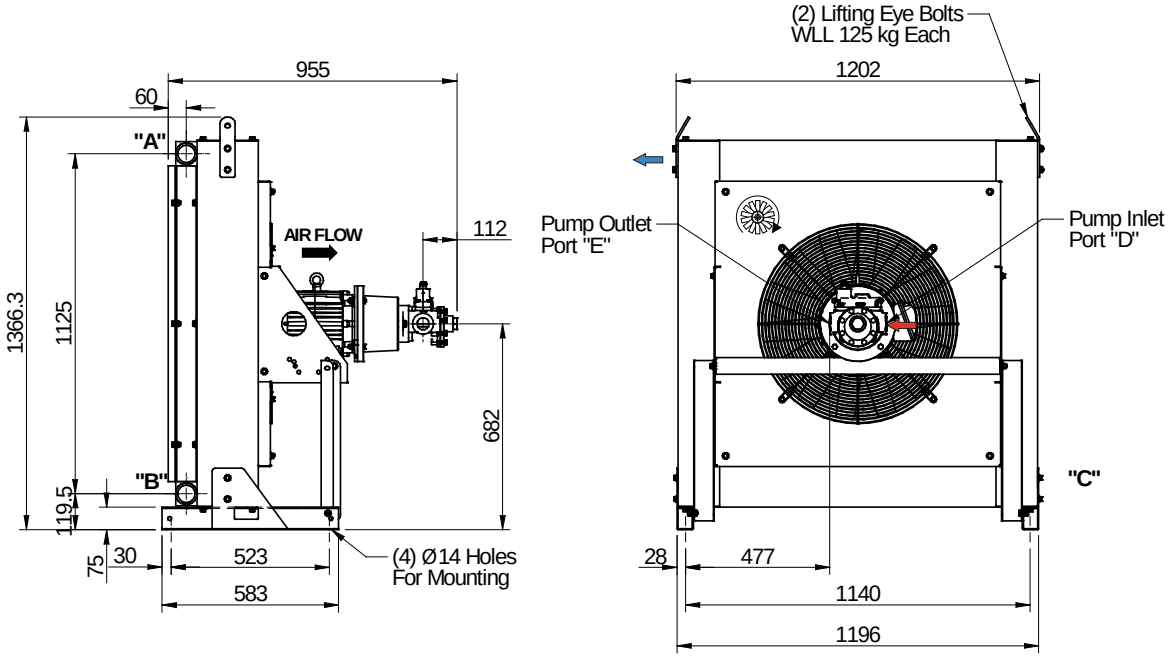


MODEL	A	B	C	D	E	F*	H	K	"A"	"B"	"C"	"D"	"E"
DC31YH5AC4HP40	683	417	620	252	658	882	760	220	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"
DC31YH5AC4HP70	683	417	620	252	658	894	760	216	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"
DC31YH5AC4HP95	683	417	620	252	658	894	760	216	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"
DC32YH6AC4HP70	847	506	785	255	840	915	940	298	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"
DC32YH6AC4HP125	847	506	785	255	840	915	940	298	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"

* Nominal, may vary with motor brand.

Heat Exchanger Ports "A" - "C" are BSPP to ISO 228/1G.
Pump Ports "D" - "E" are NPT to ASME B1.20.1

MODEL DC35 with Haight Pump



MODEL	"A"	"B"	"C"	"D"	"E"
DC35GH6AC4HP125	2"	2"	3/4"	1 1/2"	1 1/2"

* Nominal, may vary with motor brand.

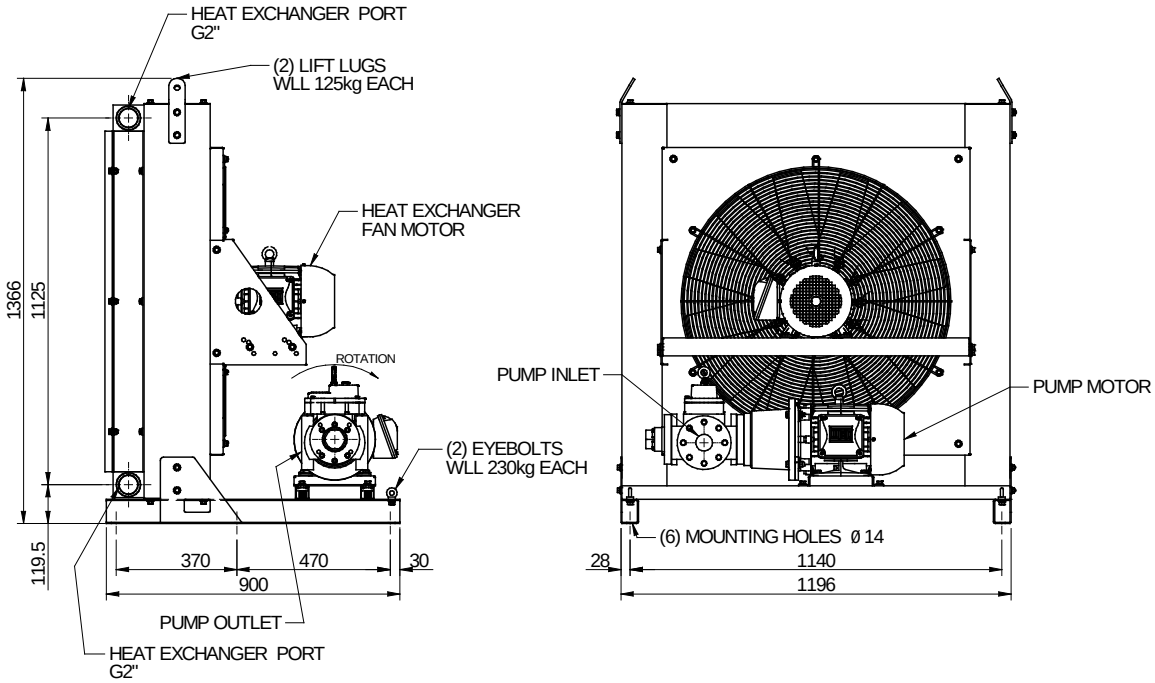
Heat Exchanger Ports "A" - "C" are BSPP to ISO 228/1G.
Pump Ports "D" - "E" are NPT to ASME B1.20.1

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

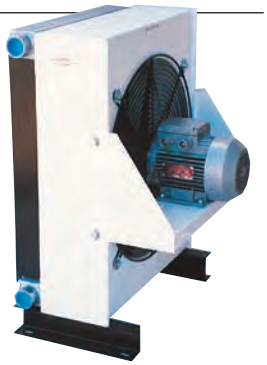
Air Cooled Exchangers With Pump/ Motor Assembly

Air Cooled Heat Exchangers with pump/motor packages are available. These units provide greater flexibility in demanding situations. Units can be supplied with different fan sizes and different oil flow combinations across our DC31, 32, 33 & 35 models and ST75 & 110 models. Heat exchangers can be fitted with thermostatic or VSD control on the fan motors for energy savings; whilst maintaining constant oil flow.
Contact our Sales Office with your application.

Model shown is a DC35LHAC6PP with 80UR Haight Pump.



Special Application Air Cooled Oil Coolers



Air cooled oil heat exchangers for use where the standard aluminium element type oil coolers are not acceptable for the following reasons.

- Circuits where higher pressures are expected to be encountered.
- Where the atmosphere or the process fluids are not compatible with aluminium.
- Where explosive environments prevent the use of aluminium. Eg :- Coal Mines.
- Where lower internal film coefficient is required for use with higher viscosity oils.
- Where heavy dust laden environments exist. These units have anticlogging type fins.

SERIES 'S' MODEL CODES

ST 75 R H 8 AC 6 00 #

SERIES ST

BASIC MODEL NUMBER = 40, 50, 75 & 110 etc.

COOLING ELEMENT TYPE
R = Steel fin, copper tubes, steel tanks - Operating pressure 20 Bar.

PORT ORIENTATION
H = Horizontal. V = Vertical

FAN DIAMETER (mm)
4 = Ø450
5 = Ø500
6 = Ø630
8 = Ø800
9 = Ø900

BASIC DRIVE TYPE
AC = 3 Phase electric motor.
AD = 1 Phase electric motor.
HF = Hydraulic orbit motor with end ports.
HQ = Hydraulic orbit motor with side ports (Optional).
HV = Hydraulic vane motor.
HX = No motor (hydraulic motor mounting provided. Customer to specify motor details).
NM = No motor (electric motor mounting provided).
GA = Air motor.

MOTOR SPEED
4 = 4 Pole Nom. 1450rpm at 50 Hz
6 = 6 Pole Nom. 950rpm at 50 Hz
8 = 8 Pole Nom. 750rpm at 50 Hz

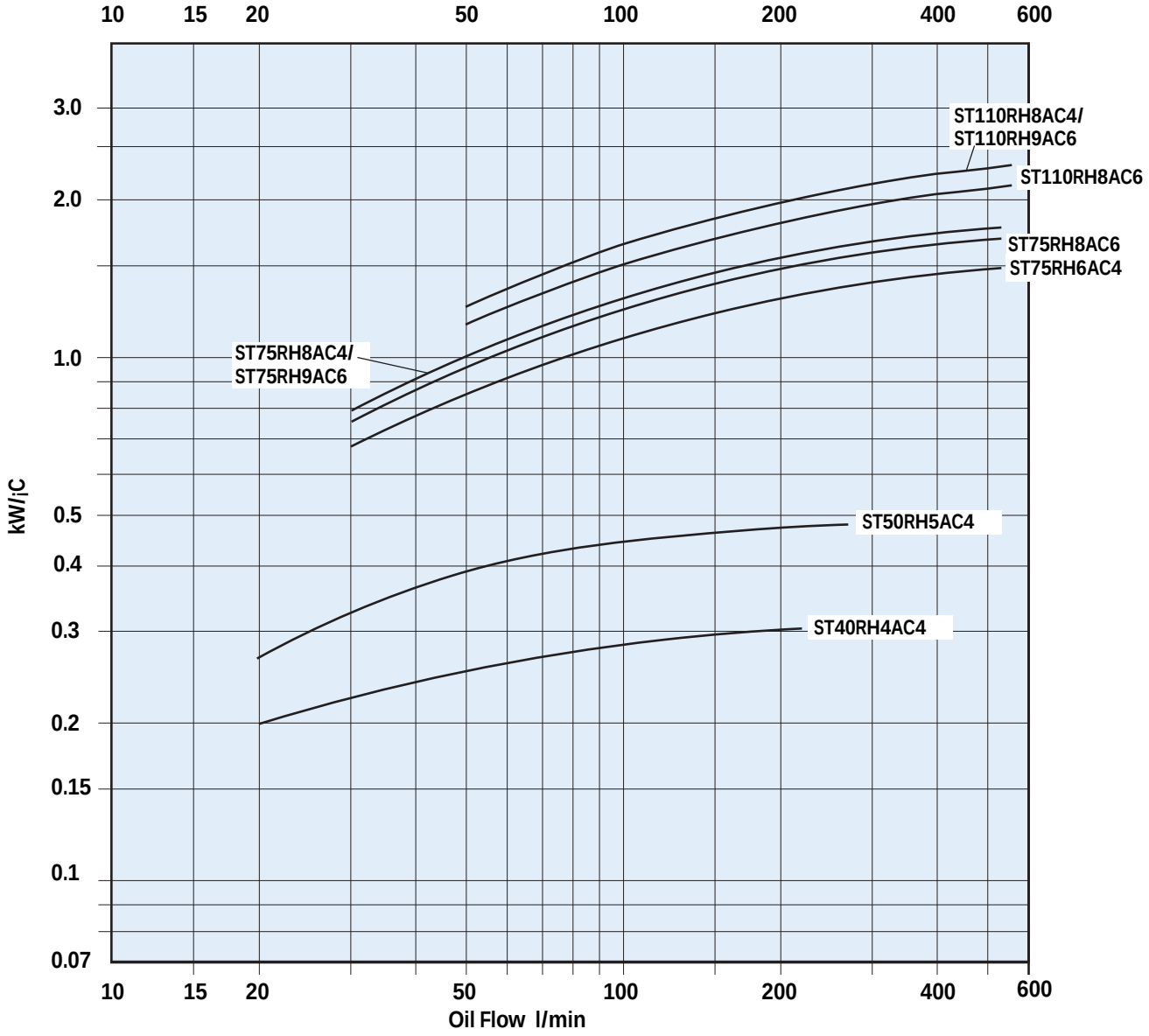
SPECIAL DETAILS OR FINISH
00 or none = 415V 50Hz.
01 = 240V 50Hz.
0A = with antistatic fan with silumin retainers (Not suitable for underground coal mine use).
0C = with antistatic fan with steel or zinc retainers (Suitable for underground coal mine use).
0R = with relief valve.

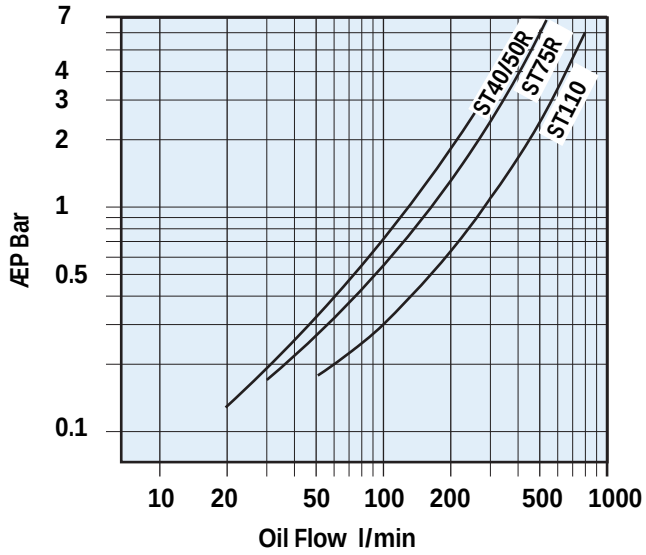
 # Not all combinations are available or possible.

TECHNICAL SPECIFICATIONS - STEEL CORE AC ELECTRIC MODELS

MODEL/ Part Number	Noise level * dB(A) at 1m	Fan Ø (mm)	Volts	Phase	kW	Size	Poles	Weight (kg)
ST40RH4AC400#	84	450	415	3	0.55	80	4	44
ST50RH5AC400#	86	500	415	3	0.75	80	4	60
ST75RH6AC400	89	630	415	3	1.5	90L	4	140
ST75RH8AC400	96	800	415	3	2.2	100L	4	149
ST75RH8AC600	88	800	415	3	2.2	112M	6	150
ST75RH9AC600†	88	900	415	3	2.2	112M	6	150
ST110RH8AC400	96	800	415	3	3	100L	4	275
ST110RH9AC600†	92	900	415	3	2.2	112M	6	275

* Noise levels listed are raw A weighted pressure representing worst case. Refer noise level statement page 69.
# Also available with 240 volt single phase electric motor.
† Models with Ø900 fan available with optional antistatic blades and aluminium retainers only.





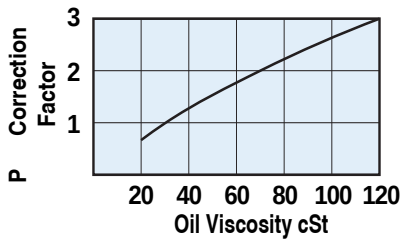
OIL COOLER SIZING

Step 1. Calculate ETD = T_{Oil} - T_{Air}
T_{Oil}= Temp °C of oil entering the cooler (usually the same as max. allowable oil temp.) T_{Air}= Expected Ambient Air Temp°C.

Step 2. Calculate kW/°C ETD = $\frac{kW}{ETD}$ kW = Heat Load.

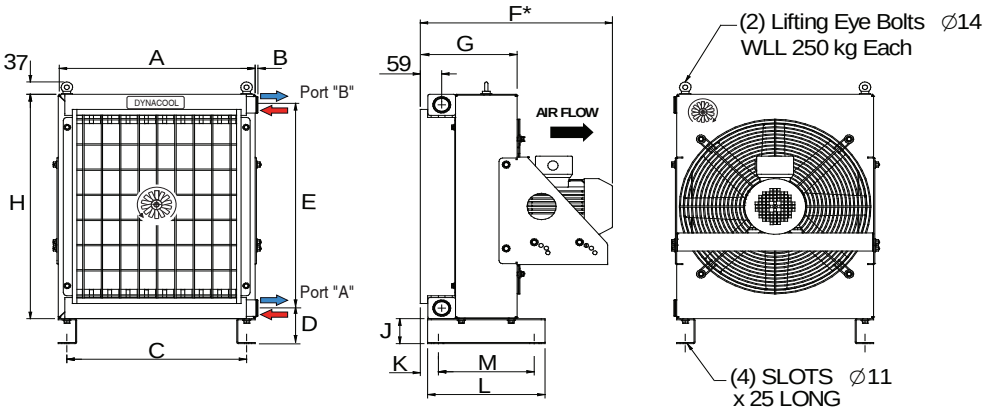
Step 3. Enter Cooler Performance Tables and select a cooler which meets or exceeds the required performance at the required oil flow rate.

Step 4. Check pressure drop of the oil cooler selected in step 3. If the average oil viscosity is not 30 cSt apply a correction for the expected viscosity.
Computer model selection program available.



Special Application Air Cooled Oil Coolers
DIMENSIONS - AC ELECTRIC SERIES ST

MODEL ST40 & ST50

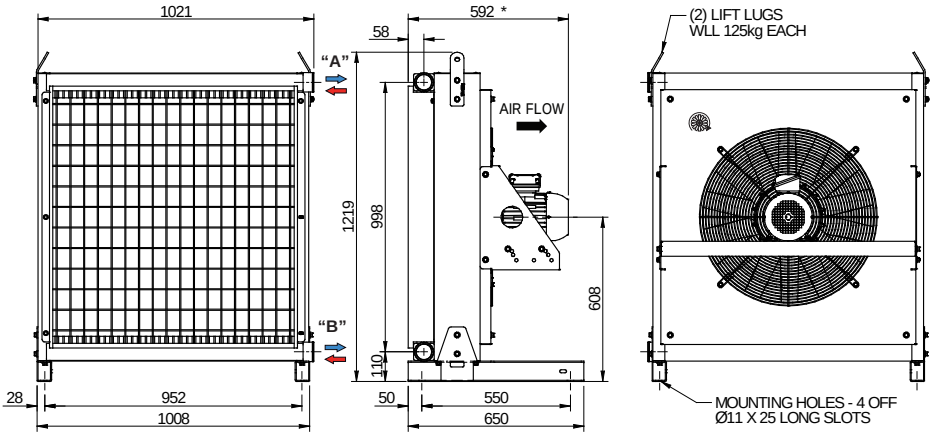


Model	A	B	C	D	E	F*	G	H	J	K	L	M	Port A	Port B	Port C	Port D
ST40R	480	-	432	107	475	518	276	615	75	50	324	264	1 1/4"	1 1/4"	-	-
ST50R	545	21	496	107	615	505	276	755	75	50	324	264	1 1/4"	1 1/4"	-	-

*Nominal Varies with motor type.

Ports BSPP to ISO 228/1G.

MODEL ST75

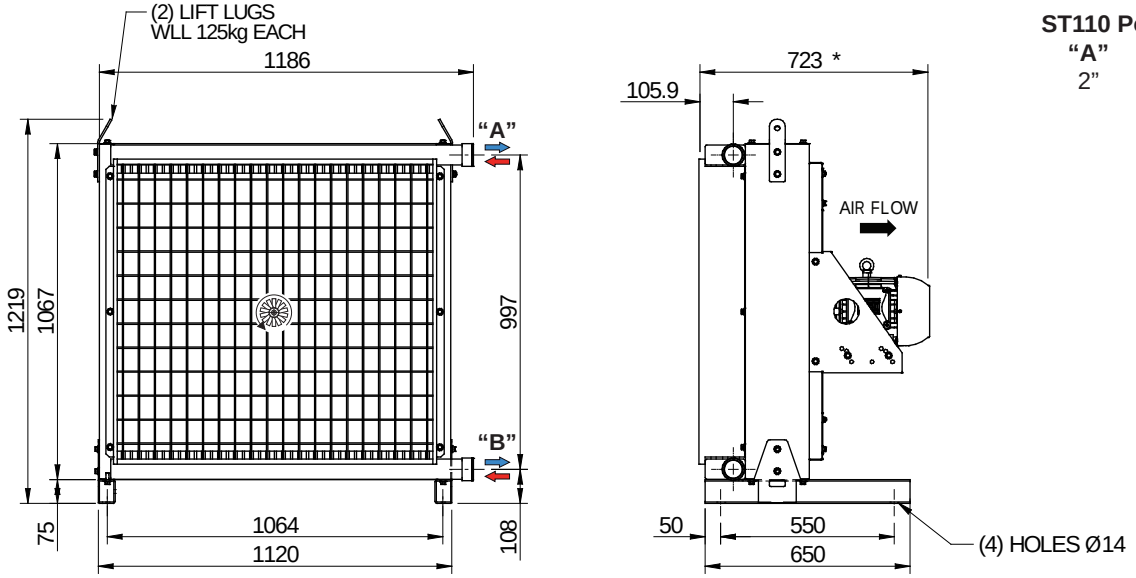


ST75 Port size

"A"	"B"
2"	2"

*Nominal Varies with motor type.

MODEL ST110



ST110 Port size

"A"	"B"
2"	2"

All ports BSPP to ISO 228/1G.

*Nominal, Varies with motor brand.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

- High performance off-line systems for oil cooling of hydraulics or gear drives in hostile environments.
- Internal relief valve for protection against over pressure or accident.

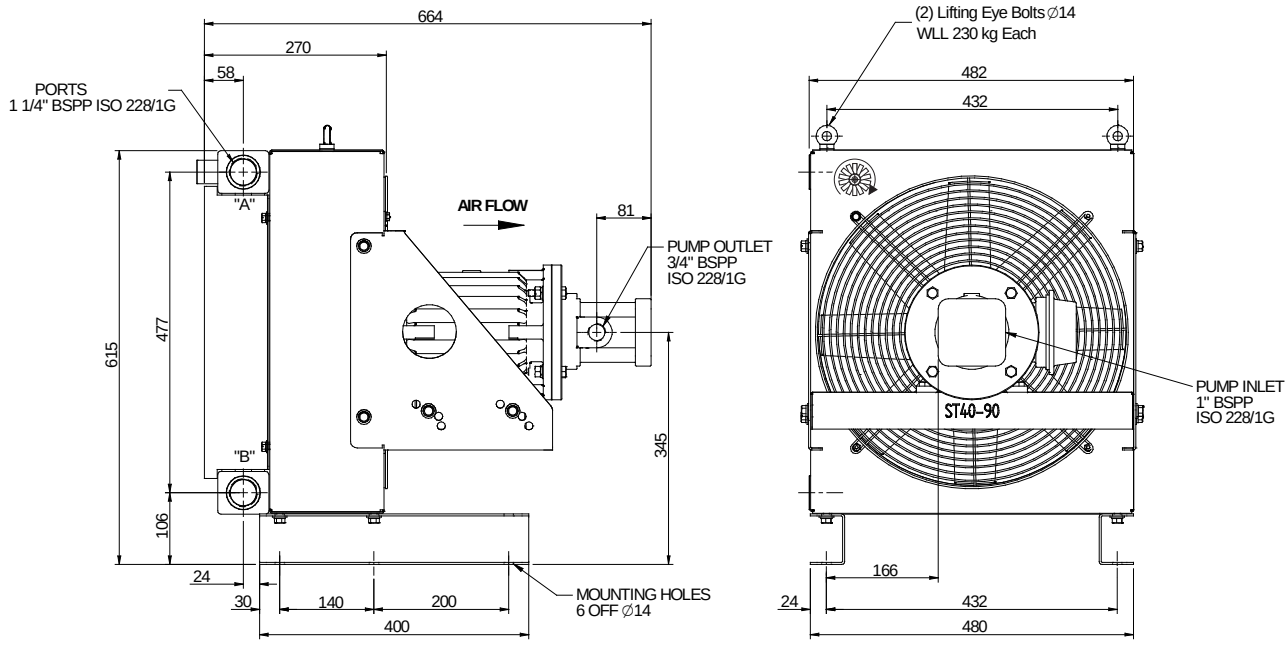
APPLICATION. Similarly to our VCL & DC range, the ST coaxial pump units are also effective for remote cooling of hydraulic circuits, or lube oil cooling for gear drives. The ST range can be manufactured to underground coal mine specification.

PUMP PRESSURE. Pump delivery pressure to 5 bar. Higher pressure ratings are available. Consult factory.

PERFORMANCE RANGE. Heat transfer range is from 0.25 to 1.4 kW/°C of ETD. Performance is based on ISO 68 hydraulic oil at 30cSt, for other fluids and viscosities please contact our sales office. ETD is the difference between the entering oil and the cooling air temperature.

CONNECTION. Please contact our sales office if the pumping head is greater than 10m or you have any special requirements. Pump inlet must be flooded.

MODEL ST40 WITH GR40 CO-AXIAL PUMP



TECHNICAL SPECIFICATIONS - STEEL CORE AC ELECTRIC MODELS

MODEL/ Part Number	Oil Flow L/min	Fan Ø (mm)	Volts	Phase	kW	Size	Poles
ST40RH4AC4GR40	40	450	415	3	1.5	90	4
ST50RH5AC4HP49	49	500	415	3	3	100L	4
ST75RH6AC4HP125	127	630	415	3	4	112M	4

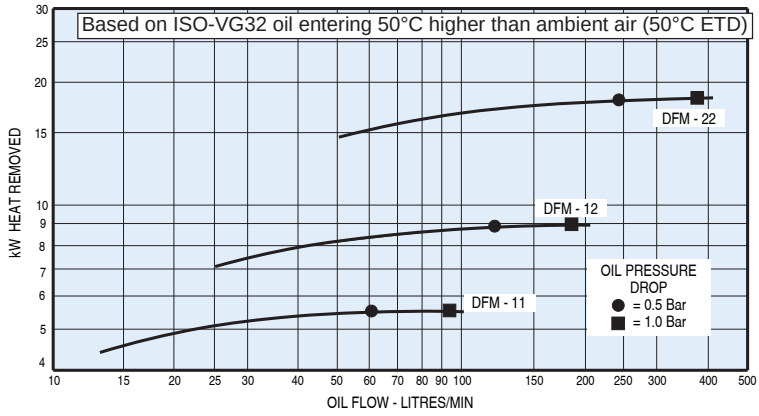
Special Application Air Cooled Oil Coolers
SPECIFICATIONS - STANDARD DC ELECTRIC MOBILE DFM SERIES

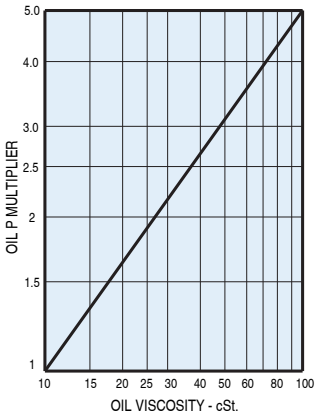
- Rugged high strength design.
- High pressure round tube construction.
- Damage resistant steel fins and tanks.
- Relief valve models available on request - consult with our Sales Office
- Refer to the accessories pages such as thermo switches, page 60 and low voltage wiring kits, page 61

MODEL DFM11

Applications - Concrete Transit Mixers, Concrete Pumps, Cranes, Harvesters, Grain Handlers, Off-Road & Construction Machines etc.

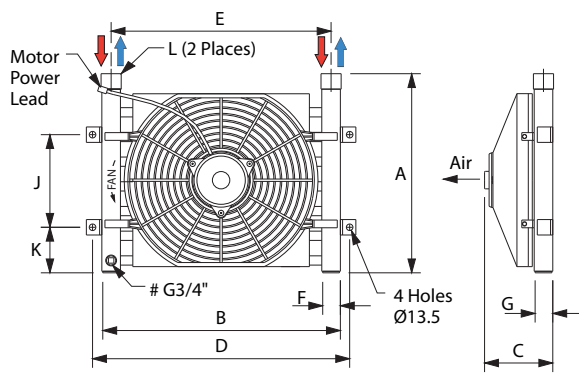
PERFORMANCE - DFM



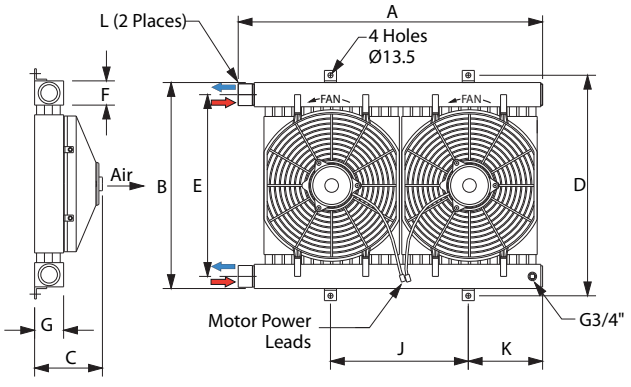


DIMENSIONS - DFM

MODELS DFM11 & DFM12



MODEL DFM22



• Pressure rating 21 Bar. • Min. burst pressure 62 Bar. All ports BSPP to ISO 228/1G.

Part No	Volts	Amps	A	B	C	D	E	F	G	J	K	L*	Wt kg
67/DFM11/12	12	12.5	411	489	130	528	452	38	38	190.5	94	G1”	10
67/DFM11/24	24	6.3	411	489	130	528	452	38	38	190.5	94	G1”	10
67/DFM12/12	12	12.5	433	540	170	578	476	64	76	190.5	94	G1 1/4”	19
67/DFM12/24	24	6.3	433	540	170	578	476	64	76	190.5	94	G1 1/4”	19
67/DFM22/12	12	25	800	540	170	578	476	64	76	362.0	196	G1 1/2”	35
67/DFM22/24	24	12.6	800	540	170	578	476	64	76	362.0	196	G1 1/2”	35

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

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Air After Coolers

All Versacool & Dynacool Air Heat Exchangers are suitable for cooling compressed air in air-after cooling applications. Versacool heat exchanger models may be rotated so that the ports are orientated vertically. This assists water condensate to drain from the heat exchanger core. The fan/ motor assembly may be rotated at 90° increments to suit operational requirements.

Notes On Selection

1. To select a suitable air after cooler model, first determine the % effectiveness from the formula as shown below.

$$\text{Effectiveness \%} = \frac{T1 - T2}{T1 - t1}$$

or

$$T2 = T1 - \text{Eff \%} (T1-t1)$$

Where: T1 = Air line temp entering cooler.
T2 = Air line temp leaving cooler.
t1 = Design ambient air temp to fan.

2. With air flow known, refer to the performance/ effectiveness charts on the following page.

3. With reference to the charts, from the horizontal scale read the known SCFM value. From the vertical scale, read the % effectiveness as determined previously. Where these two values intersect select the performance curve to the right for a suitable air after cooler model.

Example
With an airflow of 200 SCFM and a required % effectiveness of 90%, then a VCL6XAC50 model will be suitable.

SCFM = Standard Cubic Feet Per Minute.
To convert to Standard Cubic Metres Per Minute divide SCFM by 35.335.

Model VCL7XAC50

ΔP Column = Pressure drop of the air through the aftercooler is in lbs per square inch (PSI).
Pressure drop values are valid for 85% effectiveness.

Higher air flows than stated may be passed through most models. However, effectiveness % will reduce and ΔP will increase.

Data is valid for air pressure in the 100 PSIG (6.9 BAR) Range.

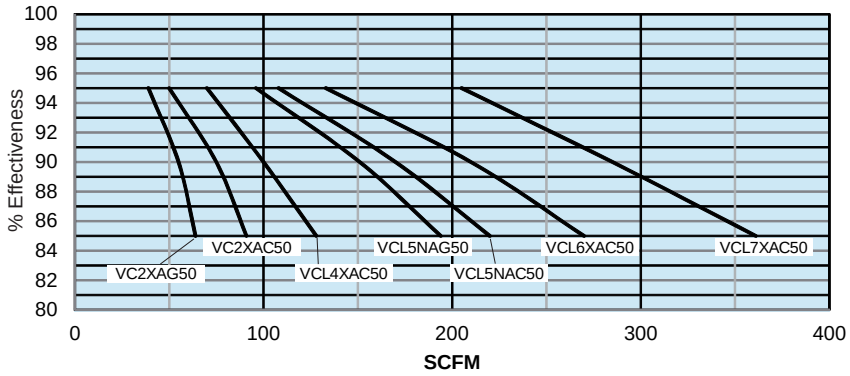
For more details consult our sales office.

MODEL/ Part Number	ΔP PSIG (max)	Noise level * dB(A) at 1m	Fan Ø (mm)	Volts	Phase	kW	Size	Poles	Weight (kg)
VC2XAC50	4.8	82	243	415	3	0.25	63	2	12
VC2XAD50	4.8	82	243	240	1	0.24	63	2	12
VC2XAG50	2.6	65	243	415	3	0.18	63	4	12
VC2XAH50	2.6	65	243	240	1	0.18	63	4	12
VCL4XAC50	0.7	84	305	415	3	0.37	71	2	20
VCL4XAG50	0.7	68	305	415	3	0.37	71	4	20
VCL4XAD50	0.7	84	305	240	1	0.37	71	2	20
VCL4XAH50	0.7	68	305	240	1	0.37	71	4	20
VCL5NAC50	1.4	87	354	415	3	0.75	80	2	30
VCL5NAD50	1.4	87	354	240	1	0.75	80	2	30
VCL5NAG50	0.7	71	354	415	3	0.37	71	4	26
VCL5NAH50	0.7	71	354	240	1	0.37	71	4	26
VCL6XAC50	1.8	78	450	415	3	0.55	80	4	37
VCL6XAD50	1.8	78	450	240	1	0.55	80	4	37
VCL7XAC50	3.5	78	450	415	3	0.55	80	4	39
VCL7XAD50	3.5	78	450	240	1	0.55	80	4	39
DC31YV5AC400	4.3	84	500	415	3	0.75	80	4	68
DC32SV6AC400	3.0	89	630	415	3	1.5	90L	4	90
DC33VH6AC400	5.1	89	630	415	3	1.5	90L	4	180
DC35LH9AC600	5.4	92	892	415	3	2.2	112	6	210

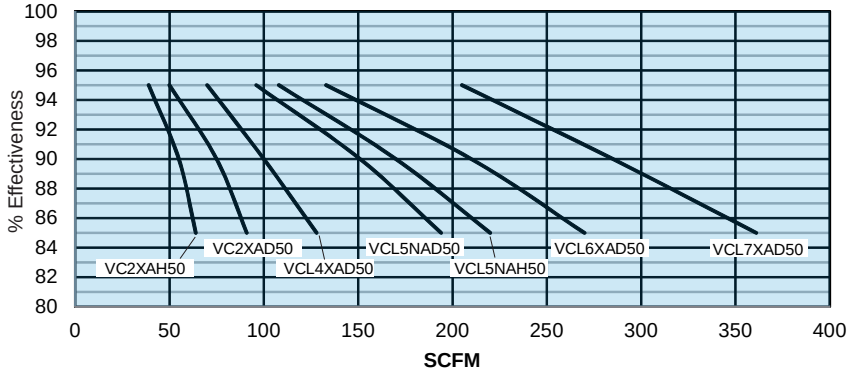
Motor Enclosures are IP55. Motor Construction to IEC 34-1.
*Nominal, Varies With Motor Brand.
For 60 Hz Models Or Other Voltage/ Frequencies, please consult with our Sales office.
Also available with 12 & 24V DC motors & air driven motors.

Performance/ Effectiveness Charts

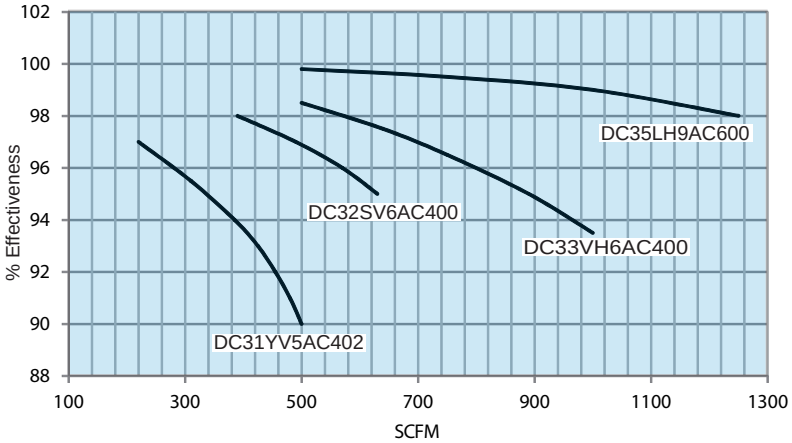
Versacool 3 Phase 415V 50Hz

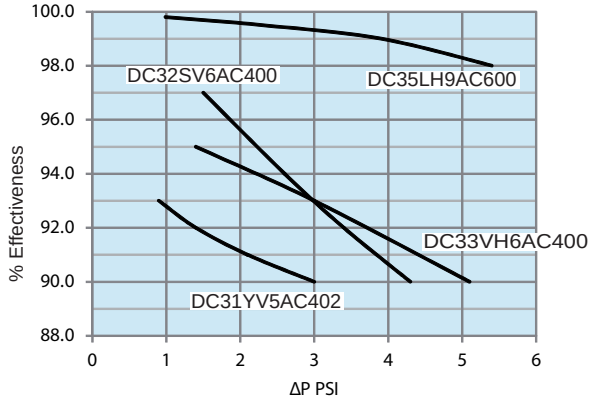


Versacool 1 Phase 240V 50 Hz



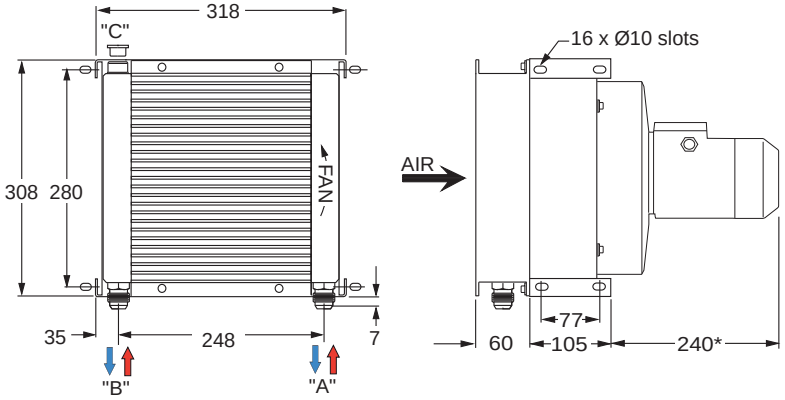
Dynacool 3 Phase 415V 50 Hz





Air After Coolers With Aluminium Cooling Elements
SPECIFICATIONS - VERSACOOL & DYNACOOL MODELS

VC2X MODEL PORTS DOWN

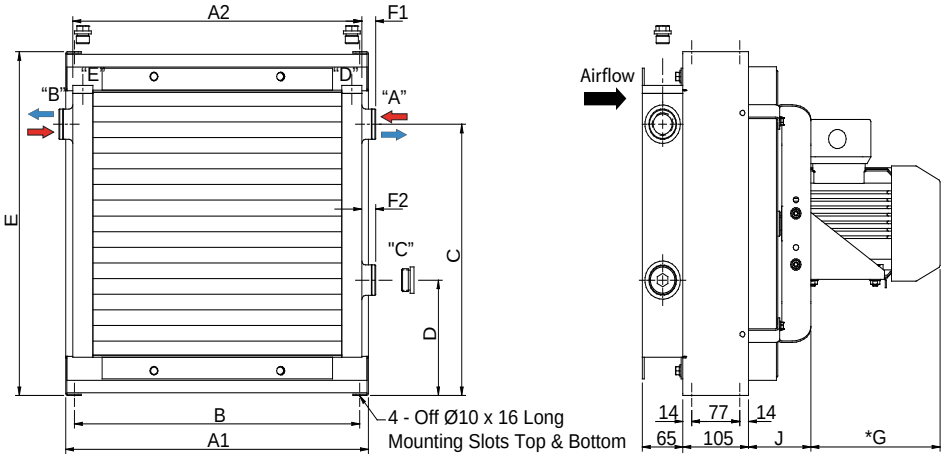


VC2XA Port size

"A"	"B"	"C"
1 1/16"	1 1/16"	1/2"

Flexible hose required
Ports A & B are Male JIC 37° flare UN. Port C is BSPP to ISO 228/1G.
*Nominal, Varies with motor brand.

VC4, VC5N, VC6X & VC7X MODEL

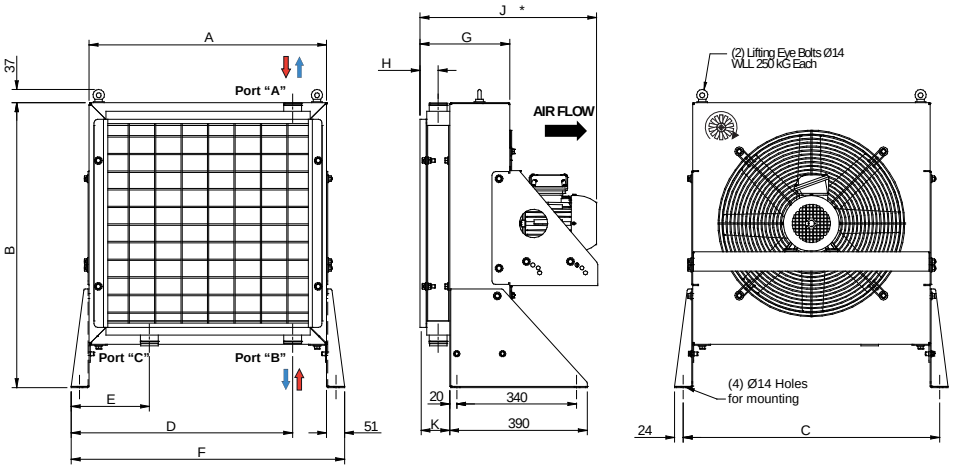


See Accessory information for foot bracket options.

Model	A1	A2	B	C	D1	D2	E	F1	F2	G*	H	J	Liq Vol L	"A"	"B"	"C"	"D"
VCL4XA	340	-	312	259	99	179	360	22	18	162	65	88	1.2	1"	1"	1"	3/4"#
VCL5NA	440	400	412	335	107	187	440	22	18	175	65	100	1.8	1"	1"	1"	3/4"
VCL6XA	485	468	457	398	170	250	505	22	18	175	65	100	2.2	1"	1"	1"	3/4"
VCL7XA	567	545	539	477	172	-	584	12	-	175	65	100	2.5	1 1/4"	1 1/4"	3/4"	-

*Nominal, Varies with motor brand. All ports BSPP to ISO 228/1G.

MODEL DC31YV & DC32SV



Model	A	B	C	D	E	F	G	H	J*	K	"A"	"B"	"C"
DC31YV	673	808	727	628	222	775	254	51	500	81	1 1/4"	1 1/4"	1 1/4"
DC32SV	839	986	893	805	142	941	280	64	600	110	2"	2"	3/4"

*Nominal, Varies with motor brand. **BSPP to ISO 228/1G.**

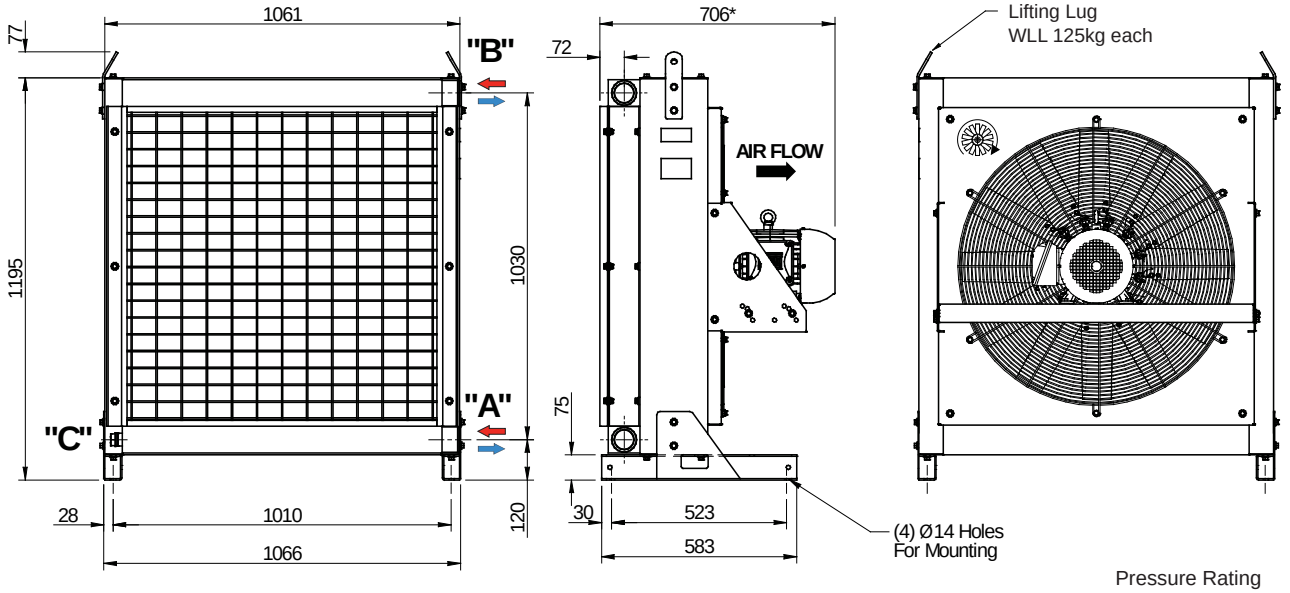
Pressure Rating
20 BAR (300 PSIG).

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

MODEL DC33

DC33 Port size

"A"	"B"	"C"
2"	2"	3/4"

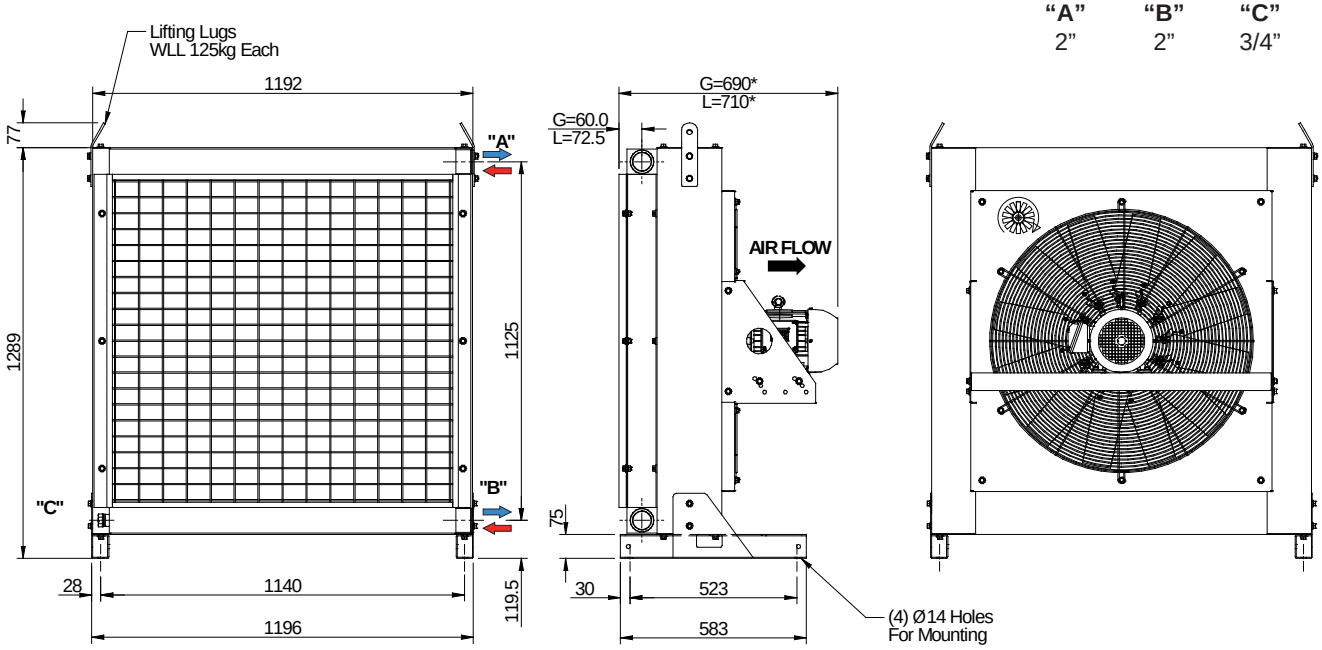


Pressure Rating
20 BAR (290 PSIG).

MODEL DC35L

DC35 Port size

"A"	"B"	"C"
2"	2"	3/4"



Pressure Rating
20 BAR (300 PSIG).

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

BASIC INFORMATION REQUIRED

A. ESTABLISH AMBIENT AIR TEMPERATURE. This is the maximum air temperature in which the cooler will be operating. It may vary depending upon what locality the appliance is being called upon to operate in.

B. DETERMINE THE INLET OIL TEMPERATURE. This is usually equal to the maximum temperature considered to be acceptable for the oil circuit.

C. DETERMINE WHAT AIR FACE VELOCITY IS AVAILABLE. AFV. In many mobile applications the cooler will be placed in front of existing engine water radiator. Ensure that the increased static pressure required to draw air through the oil cooler will not reduce the effectiveness of the engine radiator. The performance graphs are based on a AFV of 5.55 Meters per second which is equal to a vehicle road speed of 20 kph. Table 6 provides static pressures in Pa for the cooler cores.

D. ESTABLISH THE HEAT LOAD TO BE REMOVED IN KILOWATTS. Heat load in the graphs in tables 1 and 2 is expressed in Kilowatts per degree C at 30°C ETD. Heat load can be considered to be equal to the inefficiency of the system as a percentage of the power input, less the thermal dissipating capacity of the system.

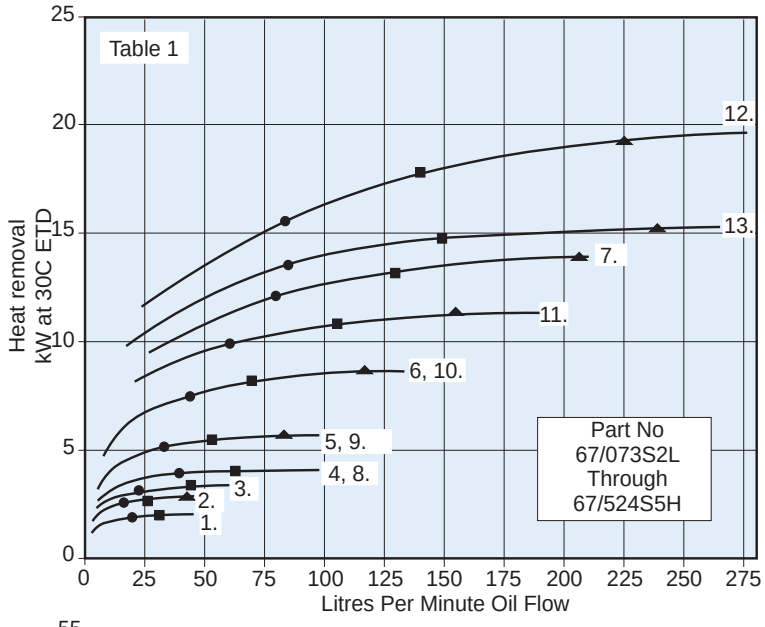
STEPS IN MAKING A COOLER SELECTION

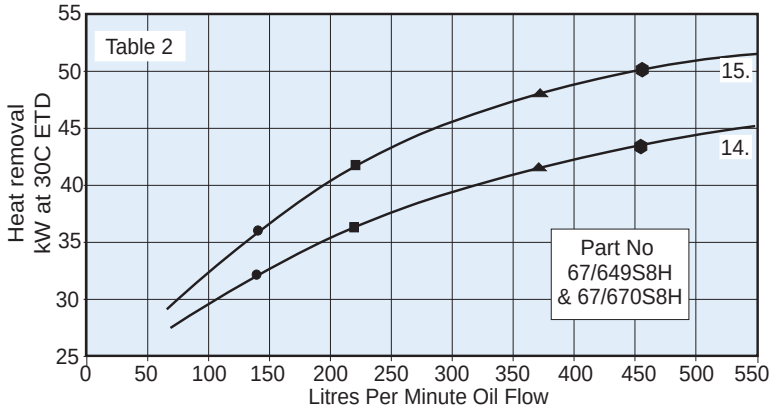
1. Calculate the ETD by subtracting the A Ambient air temperature from B the inlet oil temperature. The heat load performance graphs are based in a ETD of 30°C . If your ETD is other than 30°C make a correction for ETD as follows.

$$\text{HL from "D "} \times \left(\frac{30}{\text{ETD as calculated in 1}}\right) = \text{Corrected HL 1}$$

2. If available air face velocity is different than 5.55 m/s upon which the graphs are based, a further correction should be made for AFV "C". Refer to Table 3. Read off the correction factor for the AFV you intend to apply to the cooler and correct as follows.

$$\frac{\text{Corrected HL 1}}{\text{AFV Correction Factor (Table 3)}} = \text{Corrected HL 2}$$





3. With Corrected HL 2 enter Table 1 or Table 2 and select the cooler type equal to or greater than your application by following the appropriate lines equal to your oil flow in litres per minute and your Corrected HL 2. The number at right hand side of each curve indicates the cooler ID for the cooler type which can be read from the dimensional information on facing page. For larger coolers contact our Sales Department.

4. The Delta P (pressure drop) for the selected cooler at various oil flow rates can be established by referring to the Pressure drop symbols on each curve as explained in Table 4. These symbols are indicative of pressure drop with oil at 30 cSt viscosity. Corrections for other viscosities are shown on right hand side of the graph in table 5. To correct, multiply the pressure drop established from the graph symbols by the correction factor from Table 5.

5. Most of our Mobile Oil Coolers are available with optional full flow built in bypass valves. Factory std. 2 BAR or optional 4 BAR springs available. Under most circumstances these units may be used as constant bypass valves. Constant bypass arrangement permits higher than rated flow to pass the cooler core under cold start up conditions while allowing maximum flow through the core when the oil reaches a temperature where a high level of cooling is required.

Operating pressure-20 Bar (290 PSI).
Min burst pressure-62 Bar (900 PSI),
Max Operating Temperature 176˚C.

Table 4:Pressure Drop Symbols
Pressure Drop BAR @ 30cSt
ISO 68 Oil at 58c (136f)
x 14.5 for PSI

0.73 BAR	1.46 BAR	2.90 BAR	4.35 BAR

Table 5: Pressure Drop Factors
Corrections For Oil Viscosity

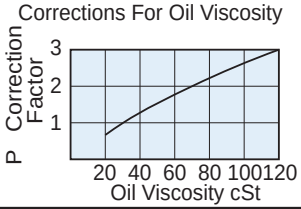


Table 3: Heat Transfer Correction Factors for Air Face Velocity In Metres Per Second

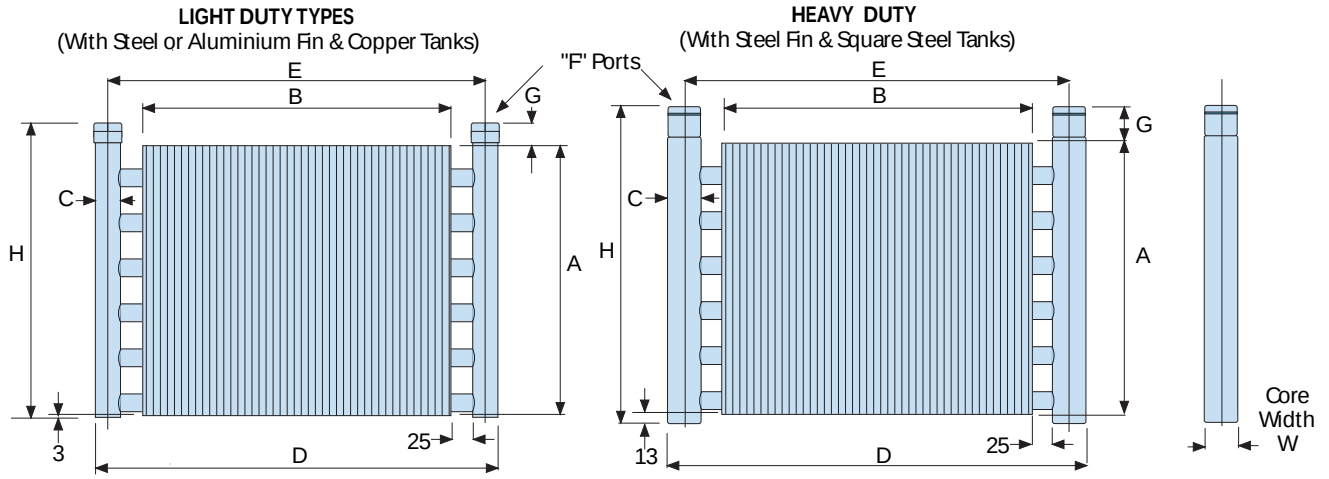
2.00	=	0.640
2.55	=	0.710
3.00	=	0.770
3.50	=	0.800
4.00	=	0.850
5.55	=	1.000
7.50	=	1.149
10.00	=	1.224
12.50	=	1.337

Table 6: Air Static Pressure Drop For Air Face Velocity In Pa

Air Flow m/s	1 Row Core	2 Row Core
2.00	25	52
2.55	36	73
3.00	43	94
3.50	55	118
4.00	65	144
5.55	105	212
7.50	174	473
10.00	274	652
12.50	473	747

in. H_2O = Pa x 0.004

Cooling Elements For Add-On or Replacement
DIMENSIONS - ROUND TUBE MOBILE SERIES DH



DIMENSIONS - LIGHT DUTY WITH STEEL FINS, COPPER TUBES & TANKS - BSPP PORTS

ID	Part No	Wt kg	Oil Vol.	A	B	C	D	E	F*	G	H	W
1	**67/073S3L**	2.3	1.0	152-- 6”	362--14.25”	28.6--1.13”	**470--18.50”**	441--17.38”	3/4”	14.2--.56”	**170--6.69”**	38-1.5”
2	**67/084S3L**	2.8	1.1	152-- 6”	514--20.25”	28.6--1.13”	**622--24.50”**	594--23.38”	3/4”	14.2--.56”	**170--6.69”**	38-1.5”
3	**67/106S3L**	3.4	1.3	203-- 8”	438--17.25”	28.5--1.12”	**543--21.38”**	516--20.32”	3/4”	14.2--.56”	**222--8.75”**	38-1.5”
4	**67/194S3L**	4.5	1.8	305--12”	349--13.75”	28.6--1.13”	**457--18.00”**	429 --16.88”	3/4”	14.2--.56”	**322--12.69”**	38-1.5”

*** All Ports Are BSPP Straight Female To ISO 228/1G. Use Parallel Face Fittings.**

DIMENSIONS - LIGHT DUTY WITH ALUMINIUM FINS, COPPER TUBES & TANKS - NPT PORTS

ID	Part No	Wt kg	Oil Vol.	A	B	C	D	E	F*	G	H	W
5	**67/216A3L/N**	3.4	2.0	305--12”	502--19.75”	28.4--1.12”	**610--24.00”**	581--22.88”	3/4”	14.2--.56”	**322--12.69”**	38-1.5”
6	**67/249A3L/N**	5.0	2.9	457--18”	502--19.75”	28.4--1.12”	**610--24.00”**	581--22.88”	3/4”	14.2--.56”	**475--18.69”**	38-1.5”
7	**67/348A4L/N**	8.3	6.7	762-- 30”	489--19.25”	35--1.38”	**610--24.00”**	575--22.62”	1”	22.3--.88”	**787--31.00”**	38-1.5”

*** All Ports Are NPT Female.**

DIMENSIONS - HEAVY DUTY WITH STEEL FINS, RHS STEEL TANKS & COPPER TUBES - BSPP PORTS

ID	Part No	Wt kg	Oil Vol.	A	B	C	D	E	F*	G	H	□W
8	**67/194S3H†**	7.0	1.1	305--12”	349--13.75”	38--1.50”	**479--18.75”**	439--17.25”	3/4”	40--1.57”	**358--14.07”**	38-1.5”
9	**67/216S4H†**	8.5	1.2	305--12”	502--19.75”	38--1.50”	**629--24.75”**	589--23.25”	1”	40--1.57”	**358--14.07”**	38-1.5”
10	**67/249S4H†**	12.0	1.8	457--18”	502--19.75”	38--1.50”	**629--24.75”**	589--23.25”	1”	40--1.57”	**510--20.07”**	38-1.5”
11	**67/326S5H**	15.0	2.3	610--24”	489--19.25”	38--1.50”	**615--24.25”**	577--22.75”	1 1/4”	45--1.75”	**651--25.63”**	38-1.5”
12	**67/425S5H†**	27.0	3.8	914--36”	628--24.75”	38--1.50”	**756--29.75”**	720--28.25”	1 1/4”	45--1.75”	**970--38.25”**	38-1.5”
13	**67/524S5H#†**	26.5	9.1	457--18”	502--19.75”	64--2.50”	**680--26.75”**	615--24.25”	1 1/4”	45--1.75”	**534--21.00”**	76-3.0”
14	**67/649S8H#†**	80.0	19.3	914--36”	883--34.75”	64--2.50”	**1061--41.75”**	997--39.25”	2”	58--2.28”	**995--39.17”**	76-3.0”
15	**67/670S8H*†**	110.0	24.5	1016--40”	883--34.75”	64--2.50”	**1061--41.75”**	997--39.25”	2”	122--4.81”	**1150--45.31”**	127-5.0”

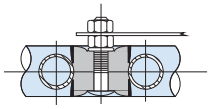
*** All Ports Are BSPP Straight Female To ISO 228/1G. Use Parallel Face Fittings.**

# Indicates 2 row core * Indicates 3 row core.

All dimensions shown are in mm.

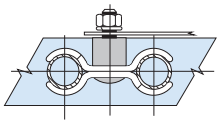
† Bypass Valves are available for these models - refer to sales office for details.

MOUNTING SYSTEMS



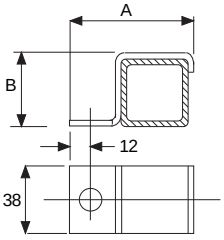
Rubber Squeeze Block

For use on Light Duty types. Fit between two tubes in gap between tank and fins. Kit includes mtg strap and 5/16” bolt. 4 required. **Kit No L-84741**



Saddle Bracket

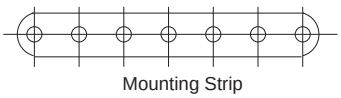
For use on Light Duty or Heavy Duty types. Clamps to two tubes in gap between tank and fins. Kit includes mtg strap, 15 mm steel spacer and 5/16” bolt. 4 required on Heavy Duty types.
Kit No L-81886



Tank Mount Angle Bracket

For use on Heavy Duty types. 3 mm Steel brackets with 11 mm bolt-down hole, may be used as removable clamps or may be welded to tanks by customer. 4 required.

	A	B
Pt 67/03/03839 Single Row Cores	70	41
Pt 67/03/03840 Two Row Cores.	96	79



Mounting Strip

Mounting Strips are useful for attachment applications and are made from 1.4 mm steel 173mm long 26mm wide and have 7 x 8.5mm ES holes on 25.4mm centres. They are shipped standard when Kits L- 84741 or L-81886 are ordered.

Port Connections

Ports. All port nozzles are BSPP Female to ISO 228/1G. Although BSPT fitting may be used with thread sealer, the preferred fittings are BSPP O Ring type.

Light Duty Types. Rubber hoses must be used at the port connections. Use two wrenches when tightening fittings, one on the fitting and the other on the port nozzle hex.

Heavy Duty Types. May be hard piped providing excess strain is not applied to the port nozzles.

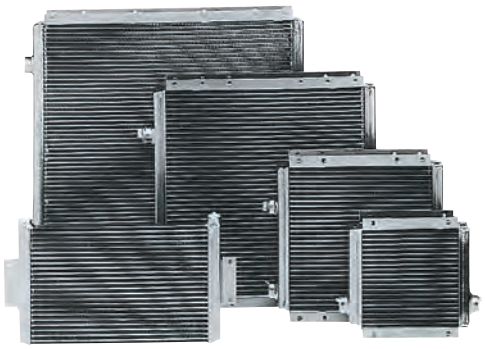
All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Cooling Elements For Add-On or Replacement
ALUMINIUM CORES

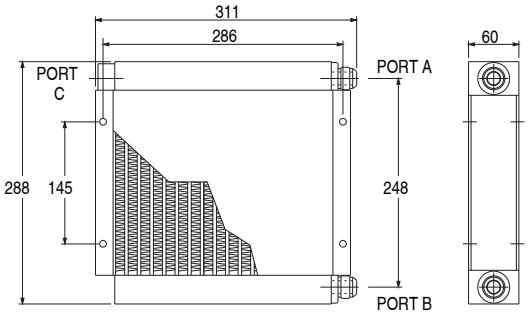
Part No	Type	A mm	B mm	C mm	D mm	E mm	J mm	K mm	F	G	L	H mm	W mm	Max Flow l/min	Heat* Cap. kW	Weight kg	Oil Vol. (l)	Cat.
18/06183	**-**	-	-	-	-	-	-	-	-	-	-	-	-	100	4	4	1	2
18/07804	**A**	295	330	203	13	65	160	-	1”	1”	1/2”	266	258	140	6.5	6	1.3	4
18/07805	**A**	365	400	203	13	65	228	-	1”	1”	1/2”	336	325	150	9.5	8	2.0	5
18/07806	**A**	432	463	203	13	65	229	-	1”	1”	1/2”	399	392	180	14	10	2.5	6
18/07807	**A**	515	543	203	13	65	305	-	1 1/4”	3/4”	1/2”	479	473	200	23	13.5	3.2	7
18/05928	**-**	-	-	-	-	-	-	-	-	-	-	-	-	230	26	27	4.0	8
1E2926	**B**	622	635	355	10	65	406	-	1 1/4”	1 1/4”	-	565	578	240	33	21	4.4	31
1E2927	**B**	800	801	508	10	65	585	-	1 1/4”	1 1/4”	-	730	755	300	55	30	6.5	32Y
21/04996	**B**	800	821	508	13	90	663	-	2”	3/4”	-	731	764	400	60	33.0	7.7	32S
18/06304	**-**	-	-	-	-	-	-	-	-	-	-	-	-	570	92	75	15	33
18/06507	**C**	1205	1181	400	13	70	1125	-	2”	3/4”	-	1045	1086	420	-	63.0	17.9	35G
18/06524	**C**	1205	1181	400	13	95	1125	-	2”	3/4”	-	1045	1086	570	130	81.0	24.6	35L

Ports for all coolers listed above are BSPP to ISO 228/1G.
* Heat capacity is at max oil flow, airflow of 5.1 m/s velocity through the core and oil/air inlet temp. difference of 30°C.

HI-FLOW SERIES ALUMINIUM CORES - 14 Bar



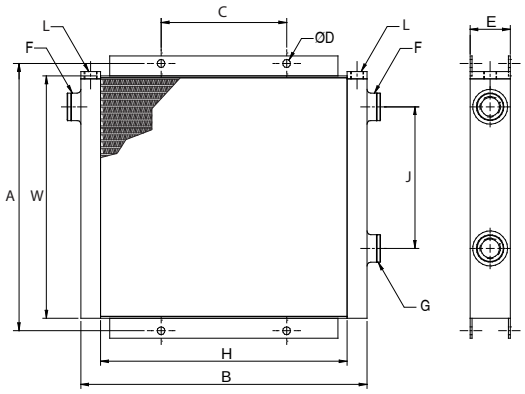
PART NO. 18/06183 Weight 4 kg



Ports A and B are Male JIC 37° flare UN type 1 1/16” 12TPI.
C is 1/2” BSPP to ISO 228/1G. Flexible hose required.

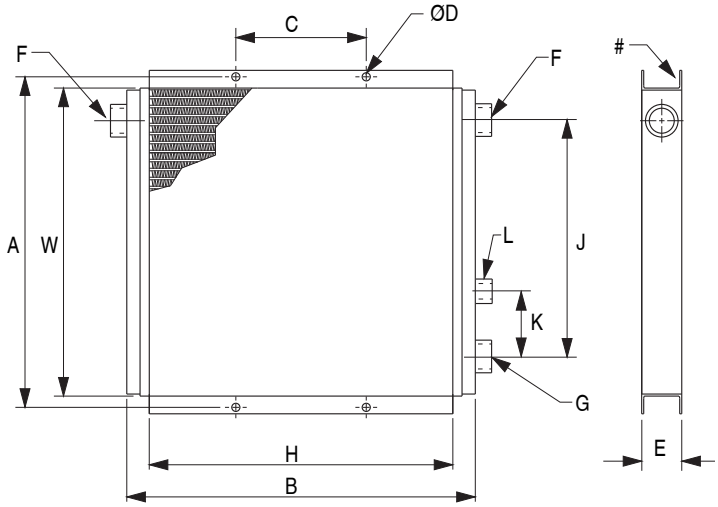
HI-FLOW SERIES ALUMINIUM CORES - 20 BAR

TYPE A



- 20 bar Pressure rating.
- 130°C Temperature rating
- Very low pressure drop.
- Suitable as air aftercooler.

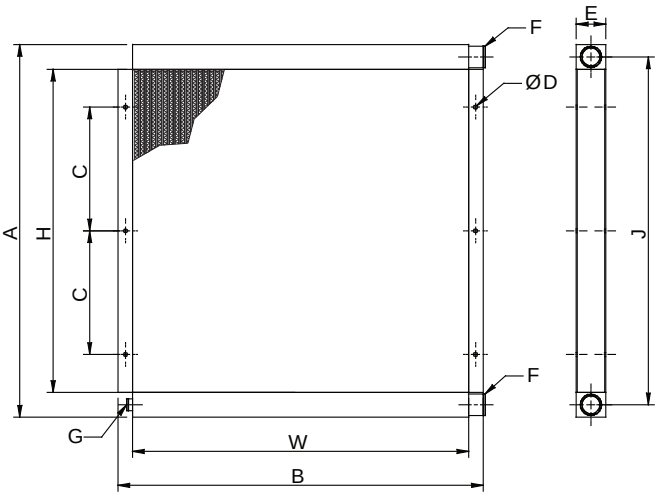
TYPE B



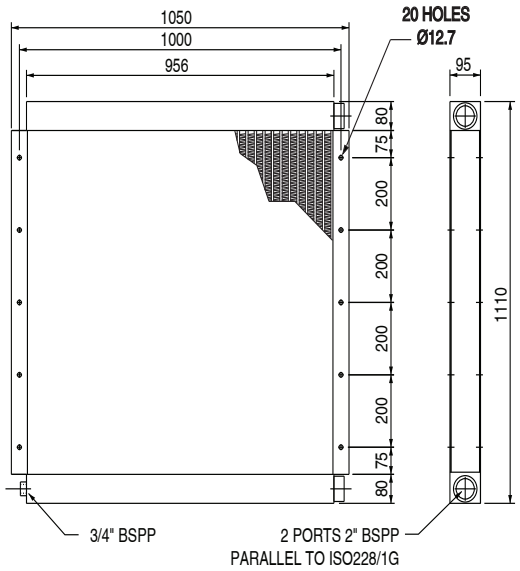
Some older models have a single flange.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

TYPE C

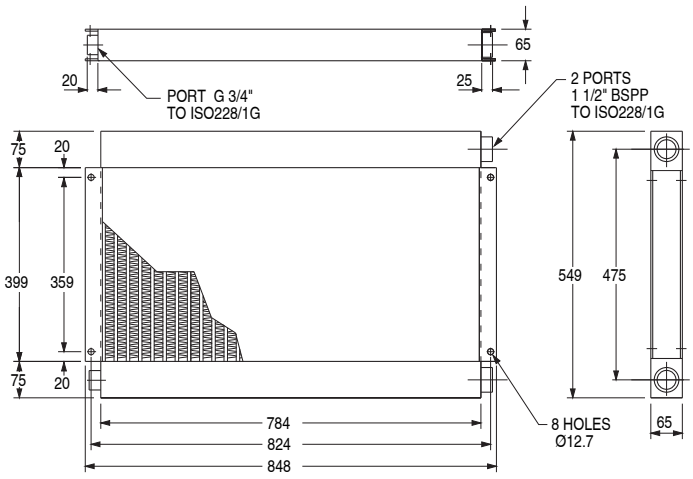


Part No. 18/06304
Weight 75 kg



HI-FLOW SERIES ALUMINIUM CORES - 30 BAR

- **Part No. 18/05928**
- 30 bar Pressure rating.
- 130°C Temperature rating
- Weight 27 kg.



All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Cooling Elements For Add-On or Replacement
EARLY SERIES ALUMINIUM CORES

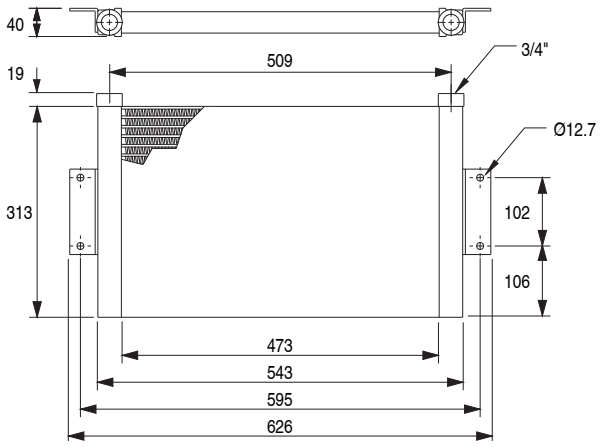
Part No	Type	A mm	B mm	C mm	D mm	E mm	J mm	K mm	F	G	L	H mm	W mm	Max Flow l/min	Heat* Cap. kW	Weight kg	Oil Vol. (l)	Cat.
21/05030	**D**	-	-	-	-	-	-	-	-	-	-	-	-	60	9	5.8		
21/04778	E	295	330	203	13	65	160	-	1”	1”	3/4”	262	250	140	6.5	6	1.3	4
18/05824	**E**	365	400	203	13	65	228	80	1”	1”	3/4”	336	352	150	-	8	2.0	5
21/04779	**E**	432	467	203	13	65	229	-	1”	1”	3/4”	397	403	180	14	10	2.5	6
21/04994	**E**	514	543	203	13	65	305	-	1 1/4”	3/4”	-	473	479	200	23	13.5	3.2	7
21/05031S	**F**	1086	1114	813	12	95	984	-	2”	3/4”	-	1076	1086	570	-	81.0	24.6	35U
18/05828	**F**	1086	1115	813	13	70	986	-	2”	3/4”	-	1045	1086	-	-	63.0	17.9	35Y

Ports for all coolers listed above are BSPP to ISO 228/1G.
* Heat capacity is at max oil flow, airflow of 5.1 m/s velocity through the core and oil/air inlet temp. difference of 30°C

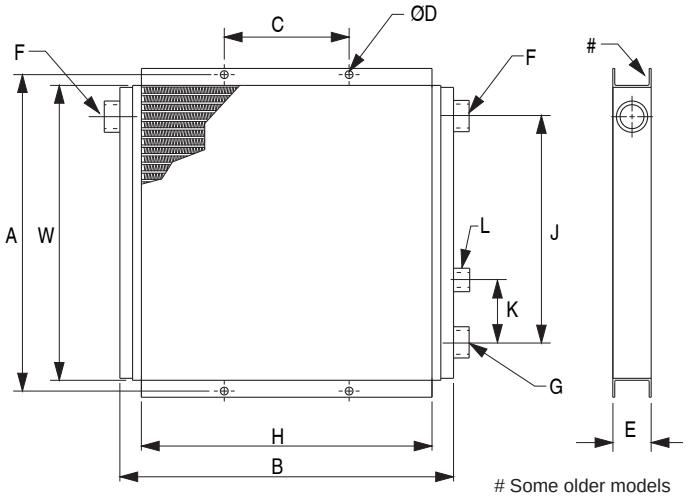
Current Part No	Recent Part No.		Cross reference	Old OEM (BSP)	Other (NPT)
18/07804	21/04778	1E4018	66/01/00258	1E2922	1E2928
18/07805	1805824	-	-	-	-
18/07806	21/04779	1E2924	66/01/00259	-	1E2929
18/07807	21/04994	-	-	-	-
1E2926	-	-	66/01/00950	-	1E2931
1E2927	-	-	66/01/00951	-	1E2932
18/05828	-	1E4041	66/01/03712	3560 (Ext’d tank)	1E2966

Caution: Some original model coolers were supplied with NPT threaded ports. All new coolers have BSPP threaded ports. BSPP ports have a groove machined on the OD to assist in identifying the thread.

TYPE D

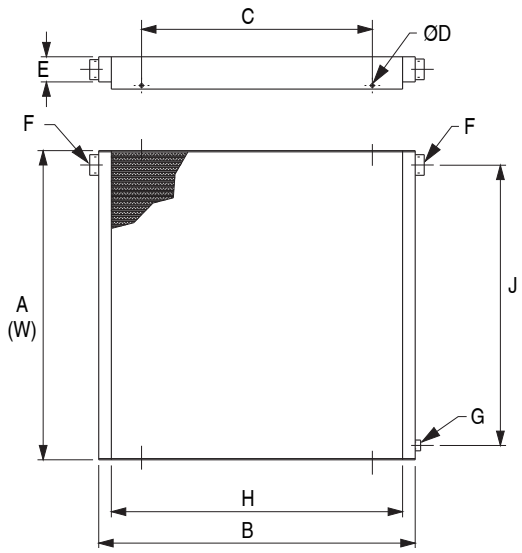


TYPE E



Some older models have a single flange.

TYPE F



All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

- Extended surface to minimise water consumption.
- Anodes, Cu Ni Tubes available as options.
- Water Flow Controls are available as options.

TECHNICAL SPECIFICATIONS

Materials

Shell..... Steel.
Tubes..... Copper or Copper/Nickel.
Tubesheets..... Steel.
Baffles..... Steel.
Fins..... Aluminium.
Mounting Brackets..... Steel.
End Caps..... Grey Iron.
Gaskets ..... Nitrile Rubber/Cellulose Fibre.
Nameplate ..... Aluminium Foil.
Anodes available as optional extra.

Maximum Flow Rates

Unit Size	Shell Side Litres/Min	Tube Side Litres/min. One Pass	Two Pass
ECM1700	948	834	417
ECM1200	456	456	228

Ratings

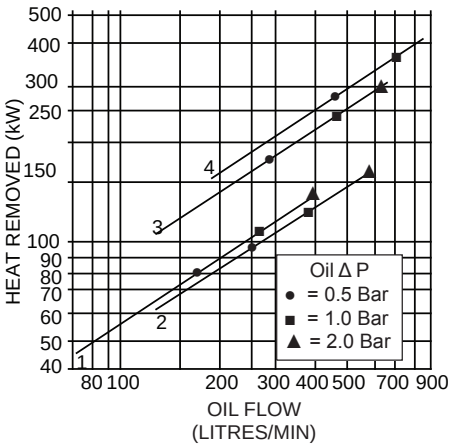
Maximum shell side pressure. . . . . 20 Bar.
Maximum tube side pressure. . . . . .10 Bar.
Maximum temperature. . . . . ..145°C.

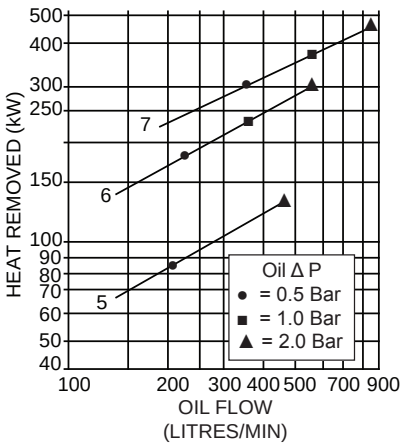
PERFORMANCE

	Part No	Wt kg
*1.	**65/ECM/1236/TSW**	56.8
2.	**65/ECM/1724/6/T**	66.0
3.	**65/ECM/1754/9/T**	125.0
4.	**65/ECM/1784/14/T**	177.0
5.	**65/ECM/1724/6/S**	66.0
6.	**65/ECM/1754/9/S**	125.0
7.	**65/ECM/1784/14/S**	177.0

* This unit suitable for seawater as coolant. Cu Ni Tubes, SS316 Tubesheet and Bronze Bonnets.

Performance curves are based on ISO VG 32 oil leaving the cooler 25°C higher than the incoming water temperature used for cooling. This is also referred to as a 25°C approach temperature.
For correction curves see page 46.



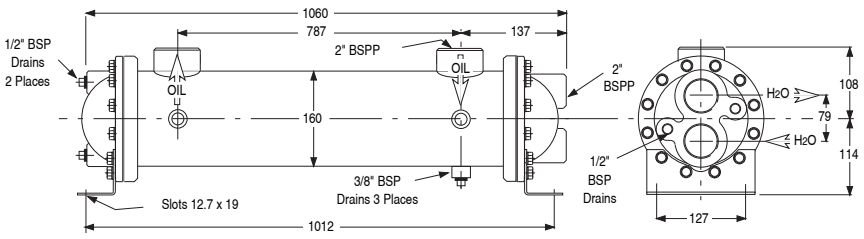


DIMENSIONS

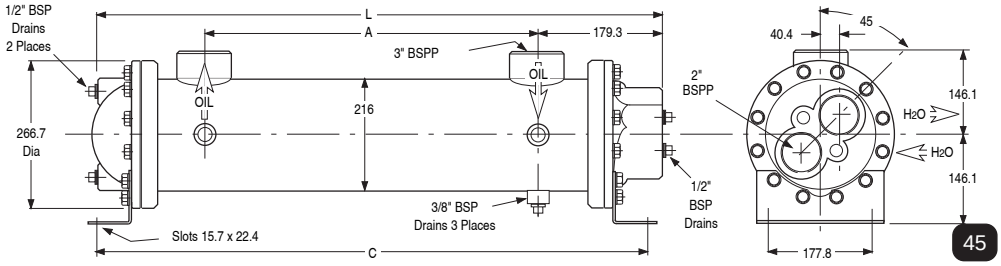
	A	C	L
ECM1724/S	476	743	818
ECM1754/S	1238	1505	1606
ECM1784/S	2000	2267	2368
ECM1724/T	476	743	822
ECM1754/T	1238	1505	1584
ECM1784/T	2000	2267	2346

All ports are BSPP female pipe thread to ISO 228/1G.
Mount slots 15.7 x 22.4 in 4 places.
Tolerance ± 3mm UNO.

Model ECM/1236



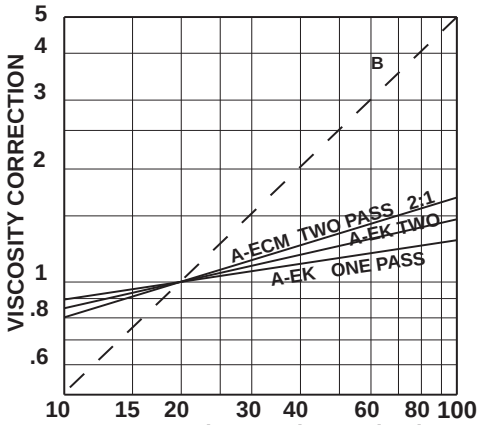
Model ECM/1724, ECM/1754 & ECM/1784



Selection procedure

Step 1. Determine the Heat Load.
This will vary with different systems, but typically coolers are sized to remove 25 to 50% of the system's input total maximum power rating. (Example: 75kW Power Unit x .33 = 25kW Heat Load)
Step 2. Determine Approach Temperature.
Desired exit oil temp°C - Water inlet temp°C = Actual Approach
Step 3. Determine Curve kW Heat Load.
Enter the information from above:
kW heat load x 25 x Viscosity Correction A = Curve kW load
Actual approach
Step 4. Find Curve Operating Point.
Locate on the graph the point determined by the oil flow and the curve kW heat load. Any cooler curve above this point will have sufficient capacity.
Step 5. Determine Oil Pressure Drop from Curves.
●= 0.5 Bar ■ = 1.0 Bar ▲= 2.0 Bar
Multiply pressure drop from curve by correction factor B found on oil viscosity correction curve.

OIL VISCOSITY CORRECTION MULTIPLIERS



Performance curves are based on ISO VG 32 oil leaving the cooler 25°C higher than the incoming water temperature used for cooling. This is also referred to as a 25°C approach temperature.

- Extended surface to minimise water consumption.
- Corrosion resistant 90/10 copper nickel tubes as standard (Cu optional).
- Water Flow Controls are available as options see pages 65.
- Surge-Cushion. The Surge-Cushion® is a protective device (patented) designed to internally bypass a portion of the oil flow during cold start conditions, or when sudden flow surges temporarily exceed the maximum flow allowed for a given cooler. This device may replace an external bypass valve, but it is not intended to bypass the total oil flow.

TECHNICAL SPECIFICATIONS

Materials

Shell..... Steel.
Tubes..... Copper/Nickel.
Tubesheets..... Steel.
Baffles..... Steel.
Fins..... Aluminium.
Mounting Brackets..... Steel.
End Caps..... Grey Iron.
Gaskets ..... Nitrile Rubber/Cellulose Fibre.
Nameplate ..... Aluminium Foil.

Maximum Flow Rates

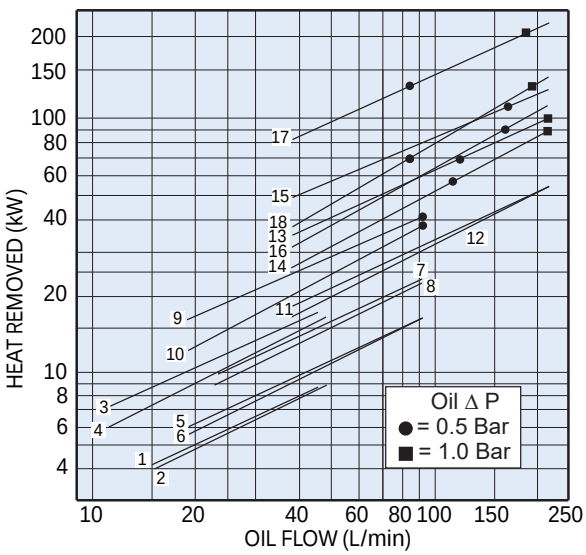
Unit Size	Shell Side Litres/Min.	Tube Side Litres/min. One Pass	Two Pass	Four Pass
25EK	75	50	23	N/A
35EK	225	90	45	23
50EK	302	212	106	53

Ratings

Maximum shell side pressure. . . . . 35 Bar.
Maximum tube side pressure. . . . . 10 Bar.
Maximum temperature. . . . . 120°C.

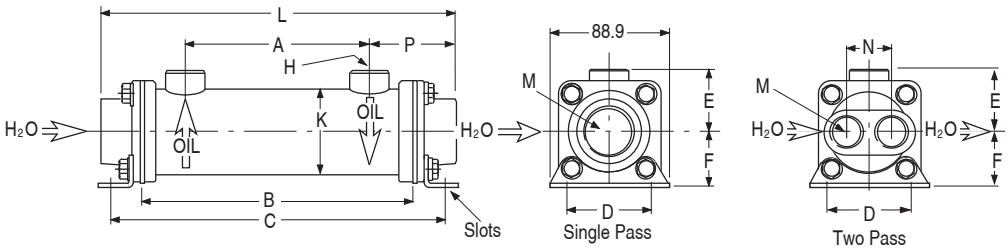
PERFORMANCE 1:1 Oil to Water Ratio One Pass Models & 2:1 Oil to Water Ratio Two Pass Models

	Models	Part No	Wt kg
1.	25EK1/1	**65/EK508OS***	3.0
2.	25EK1/2	**65/EK508TS***	3.1
3.	25EK4/1	**65/EK514OS***	5.0
4.	25EK4/2	**65/EK514TS***	5.0
5.	35EK1/1	**65/EK708O**	6.2
6.	35EK1/2	**65/EK708T**	6.2
7.	35EK2/1	**65/EK712O**	7.2
8.	35EK2/2	**65/EK712T**	7.2
9.	35EK4/1	**65/EK718O**	8.4
10.	35EK4/2	**65/EK718T**	8.4
11.	50EK2/1	**65/EK1012O**	16.6
12.	50EK2/2	**65/EK1012T**	16.6
13.	50EK4/1	**65/EK1018O**	19.1
14.	50EK4/2	**65/EK1018T**	19.1
15.	50EK5/1	**65/EK1024O**	22.2
16.	50EK5/2	**65/EK1024T**	22.2
17.	50EK6/1	**65/EK1036O**	30.4
18.	50EK6/2	**65/EK1036T**	30.4



*To order with Surge Relief omit S to part No.

25 EK SERIES

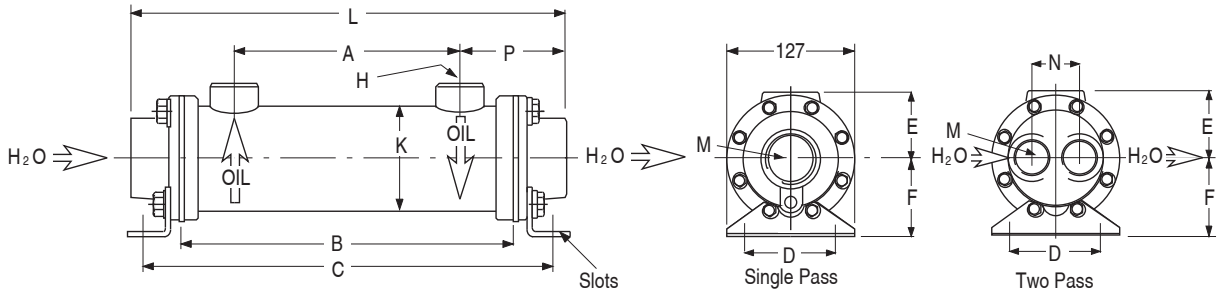


Surge cushion internal bypass relief available on 25 EK series as an option.

COMMON DIMENSIONS									Single Pass Models				Two Pass Models				
Model	A	B	C	D	E	F	H*	K		L	M*	P		L	M*	N	P
25EK1	97.8	204.5	261.9	63.5	58.0	41.1	3/4”	64.8	25EK1/1	259.8	3/4”	82.8	25EK1/2	260.3	3/8”	28.4	82.8
25EK4	250.2	360.2	417.6	63.5	58.0	41.1	3/4”	64.8	25EK4/1	416.0	3/4”	82.8	25EK4/2	416.0	3/8”	28.4	82.8

*All ports are BSPP female pipe thread to ISO 228/1G. Mount Slots 25EK = 8.6 x 12.7. Tolerance ± 3mm.

35 EK SERIES

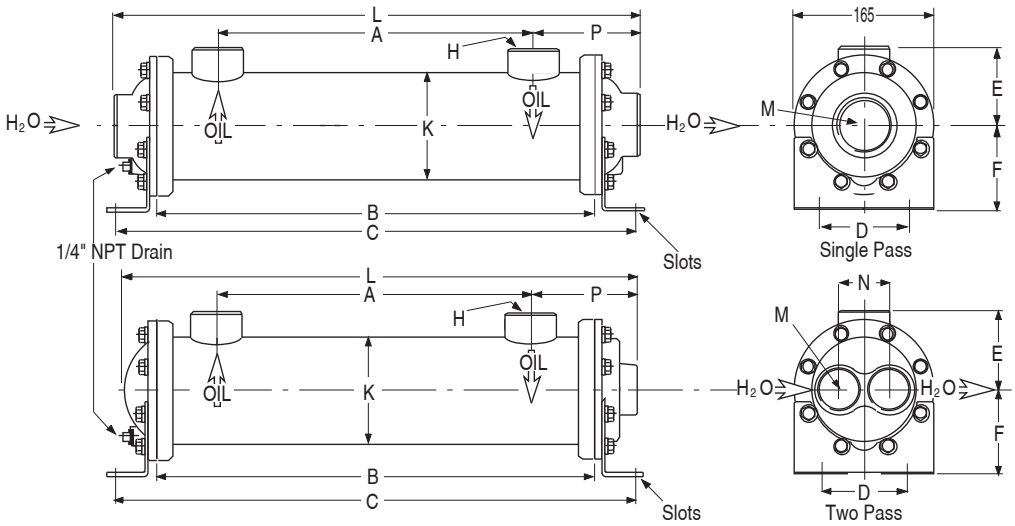


Surge cushion internal bypass relief supplied on all 35 and 50 EK series.

COMMON DIMENSIONS									Single Pass Models				Two Pass Models				
Model	A	B	C	D	E	F	H*	K		L	M*	P		L	M*	N	P
35EK1	76.2	204.5	268.5	76.2	70.9	65.8	11/2”	89.4	35EK1/1	279.2	11/4”	101.6	35EK1/2	242.6	3/4”	41.2	88.9
35EK2	177.8	306.1	370.1	76.2	70.9	65.8	11/2”	89.4	35EK2/1	380.8	11/4”	101.6	35EK2/2	344.2	3/4”	41.2	88.9
35EK4	330.2	458.5	522.5	76.2	70.9	65.8	11/2”	89.4	35EK4/1	533.2	11/4”	101.6	35EK4/2	496.6	3/4”	41.2	88.9

*All ports are BSPP female pipe thread to ISO 228/1G. Mount Slots 35EK = 11 x 19. Tolerance ± 3mm.

50 EK SERIES



Surge cushion internal bypass relief supplied on all 35 and 50 EK series.

COMMON DIMENSIONS									Single Pass Models				Two Pass Models				
Model	A	B	C	D	E	F	H*	K		L	M*	P		L	M*	N	P
50EK2	157.0	301.8	388.9	101.6	94.5	101.6	11/2”	128.3	50EK2/1	385.6	11/2”	114.3	50EK2/2	366.8	1”	60.5	113
50EK4	309.4	454.2	541.3	101.6	94.5	101.6	11/2”	128.3	50EK4/1	538.0	11/2”	114.3	50EK4/2	519.2	1”	60.5	113
50EK5	461.8	606.6	693.7	101.6	94.5	101.6	11/2”	128.3	50EK5/1	690.4	11/2”	114.3	50EK5/2	671.6	1”	60.5	113
50EK6	766.6	911.4	998.5	101.6	94.5	101.6	11/2”	128.3	50EK6/1	995.2	11/2”	114.3	50EK6/2	976.4	1”	60.5	113

*All ports are BSPP female pipe thread to ISO 228/1G. Mount Slots 50EK = 11 x 25. Tolerance ± 3mm.

Applications

- *Marine.*
- *Brackish Water.*
- *Air Aftercooling.*
- *Water to Water.*

	Part No.	Shell Side (L/min)	Tube Side (L/min)	Capacity (kW)*
1.	65/B0401/OSW	36	94	4.5
2.	65/B0701/OSW	64	230	12
3.	65/B0701/FSW	64	56	11
4.	65/B0702/OSW	110	230	18
5.	65/B0702/FSW	110	56	16
6.	65/B1003/OSW	260	550	64
7.	65/B1003/TSW	260	270	60
	65/B1006/OSW	260	550	75
	65/B1006/TSW	260	270	70
8.	65/B1206/OSW	435	848	150
9.	65/B1206/FSW	435	210	145
10.	65/B1608/OSW	960	1374	380
11.	65/B1608/FSW	960	345	370

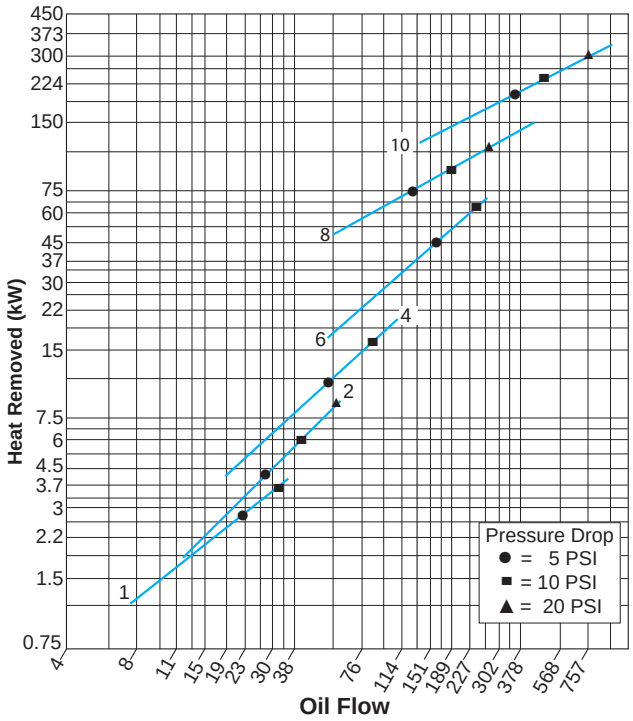
* Performance based on ISO68 oil in shell leaving at 22°C above cooling water entering temperature in tubes. Fluids at maximum flow rates. Pressure drop readings are for leaving oil temperature at 43°C.
For capacities at other operating conditions consult our sales office.

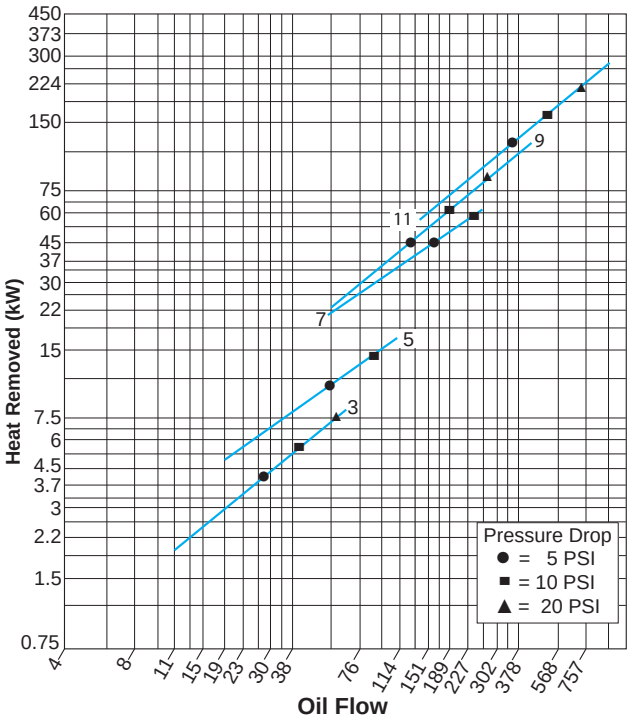
Technical Specifications
Materials

Tubes..... Copper Nickel (90/10).
Tubesheets..... Brass.
Shell..... Steel (Brass optional).
Shell Connections..... Brass.
Baffles..... Brass.
End Bonnets..... Bronze.
Mounting Brackets.... Steel.
Gaskets ..... Nitrile Rubber/Cellulose Fibre.
Hardware..... Alloy Steel/Optional SS.
Anodes ..... Zinc in Alloy Steel.

Ratings

Maximum shell side pressure. . . 17 Bar.
Maximum tube side pressure. . . .10 Bar.
Maximum temperature. . . . . .175°C.



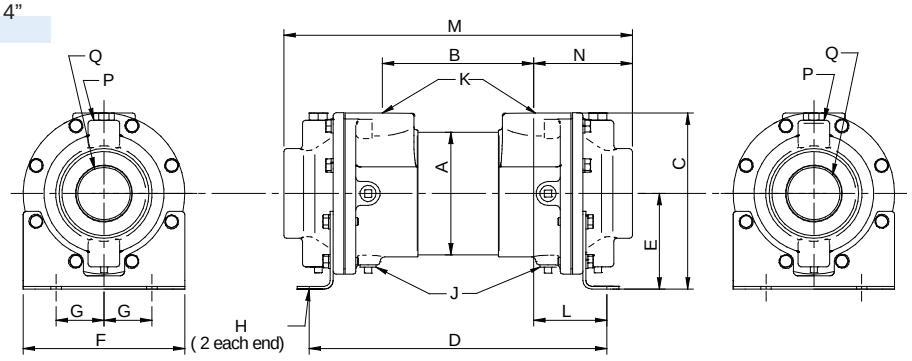


WATER COOLED

DIMENSIONS

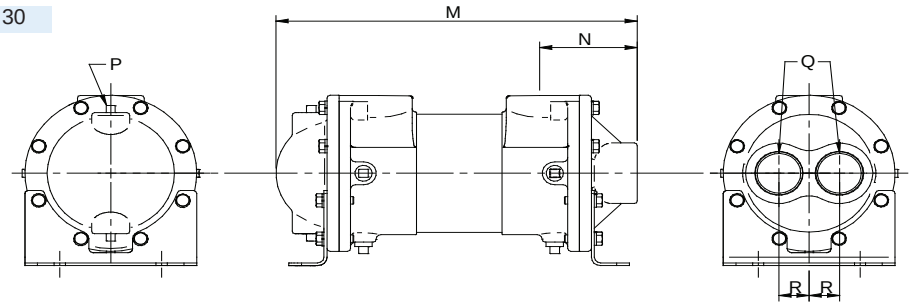
One Pass (Code "0")

	M	N	P	Q*
65/B0401/OSW	286	46	-	1"
65/B0701/OSW	347	82	3/8"	1 1/2"
65/B0702/OSW	575	82	3/8"	1 1/2"
65/B1003/OSW	828	103	3/8"	2"
65/B1006/OSW	1520	103	3/8"	2"
65/B1206/OSW	1530	124	1/2"	3"
65/B1608/OSW	2048	166	1/2"	4"



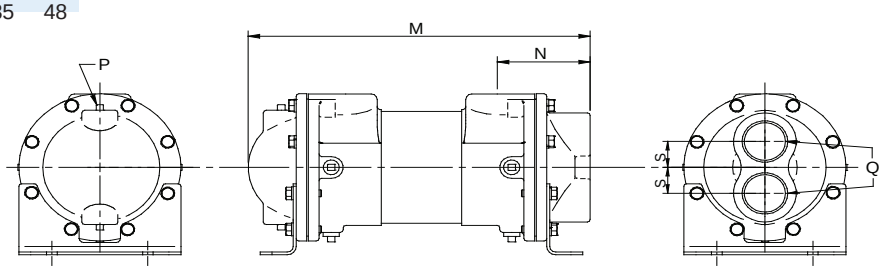
Two Pass (Code "T")

	M	N	P	Q*	R
65/B1003/TSW	820	97	3/8"	1 1/2"	30
65/B1006/TSW	1520	97	3/8"	1 1/2"	30



Four Pass (Code "F")

	M	N	P	Q*	R	S
65/B701/FSW	345	59	⅜"	¾"	16	22
65/B702/FSW	573	59	⅜"	¾"	16	22
65/B1206/FSW	1532	125	½"	1 ½"	27	36
65/B1608/FSW	2050	165	1/2"	2"	35	48



COMMON DIMENSIONS

	A	B	C	D	E	F	G	H	J	K*	L	Wt kg
B0401	54.0	193.5	88.9	279.7	49.3	66.6	22.4	Ø10.4	-	1/2"	43.7	3.2
B0701	92.9	177.8	158.8	305.1	91.9	133.4	38.1	Ø11x25	3/8"	1"	68.3	10.5
B0702	92.9	406.4	158.8	533.7	91.9	133.4	38.1	Ø11x25	3/8"	1"	68.3	12.7
B1003	130.2	622.3	187.5	780.0	101.6	171.5	50.8	Ø11x25	3/8"	1 1/2"	77.7	29.5
B1006	130.2	1314.2	187.5	1472.0	101.6	171.5	50.8	Ø11x25	3/8"	1 1/2"	77.7	40.0
B1206	155.6	1282.7	223.8	1457.5	120.7	190.5	63.5	Ø11x22	3/8"	2"	87.4	72.6
B1608	203.2	1717.0	308.1	1940.1	165.1	218.9	88.9	Ø11x25	3/8"	3"	111.5	141.0

All ports are NPT female pipe thread. BSPP available. Ports Q for cooling fluid only. Port K for oil or fluid to be cooled.

All dimensions are ± 2%.

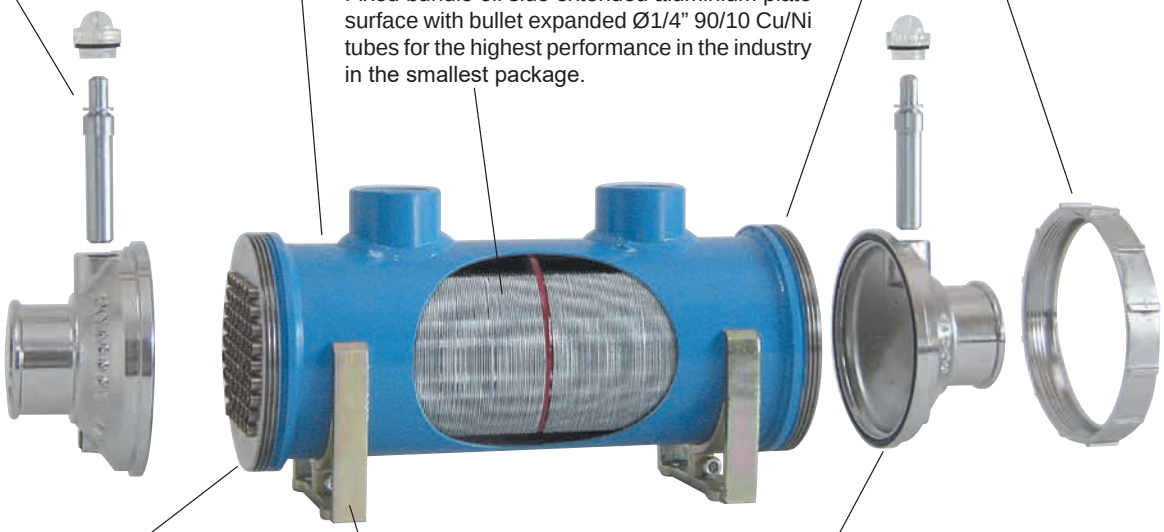
WOULD YOU PROTECT YOUR INVESTMENT WITH ANY OTHER OIL COOLER?

WM coolers are supplied with Zinc anodes fitted. WM single pass models are supplied with 2 sacrificial anodes and WM two pass models with 1 sacrificial anode. Anode cavities are accessed via a clear cap for tell tale anode condition viewing.

Rugged steel shell, electric welded to the tubesheet for resistance to pressure failure. Oil port nozzles are also electric welded to the shell.

End bonnets are all connected to the bundle using the unique threaded gland nut design which secures the bonnets in any radial orientation especially useful when using 90° bend bonnets or difficult anode access. Sealing is by O ring.

Fixed bundle oil side extended aluminium plate surface with bullet expanded Ø1/4" 90/10 Cu/Ni tubes for the highest performance in the industry in the smallest package.



Tubesheets are 11mm thick with expanded connection. WI coolers have steel tubesheets. WM coolers have 316 grade stainless steel tubesheets and 90/10 Cu/Ni tubes, the ultimate in sea water compatibility.

Removable steel mounting brackets are supplied and can be adjusted for a range of mounting spacings.

End bonnets available in Single pass straight, Single pass 90° bend and Two pass. Refer to drawings.

WM251SSS
Single pass Marine Cooler
with straight end bonnets.

WM252SSS
2 pass Marine Cooler.

WM251SSN
Single pass Marine cooler
with a straight and a 90deg bonnet.

WM - PERFORMANCE - On road or off road torque converter and power shift transmissions

Note. Model WM with its high heat conversion surface, rugged construction and straight or 90° hose tail coolant connections is well suited for use with torque converter and power shift transmissions such as Allison, Clark and Funk etc. If the engine operational water flow exceeds 250 L/m, the WM unit must have a suitable parallel bypass fitted. Refer page 56 for engine water plumbing. Consult factory for special bypass components.

Allison Transmissions up to 275 engine HP.*
WT (World Transmission) Series MD 300 & B 300.
Old models AT540, AT1540 and MT 600/300 Conv.
Use WM Oil Coolers selected by engine input HP.
WM151 max 120 HP, **WM251** max 180HP, **WM401** max 275HP.

FUNK Powershift up to 225 engine HP.*
400 Series. 1700 Series, 1000 Series.
2000 Series, DF Series.
Use WM Oil Coolers selected by engine input HP.
WM151 max 110 HP. **WM251** max 150HP, **WM401** max 225HP.

*Above selections are based on engine water entering cooler at 82°c (180°F) and oil entering at 143°c (290°F) using latent heat phase assuming steam thermal expansion characteristics.

W SERIES MATERIALS

Description	WM coolers (BLUE).
Shell & Ports	Steel.
Shell & Port finish	Zinc powder prime & powder coat.
Tubes	90/10 Copper/Nickel.
Tubesheets	Stainless Steel.
Baffles	Steel.
Fins	Aluminium.
Mounting Brackets	Zinc Plated Steel.
End Caps	Stainless Steel or Bronze.
Gaskets	Nitrile Rubber.
Nameplate	Aluminium Foil.

Note:WM Coolers must be grounded to ships electrical earth system.

W SERIES RATINGS

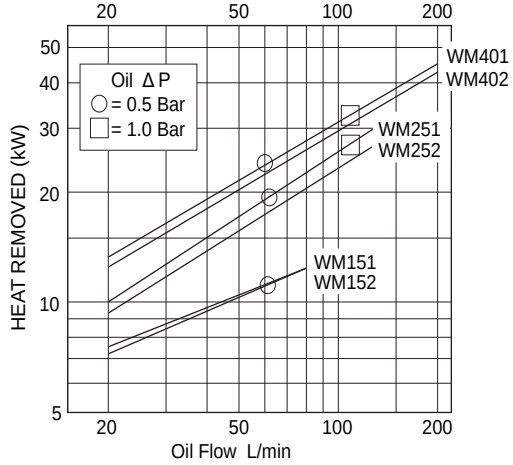
Maximum Flow Rates

Unit Size	Oil Side Litres/Min.	Water Side Litres/min. One Pass	Two Pass
WM15	80	170	80
WM25	130	170	80
WM40	200	170	80

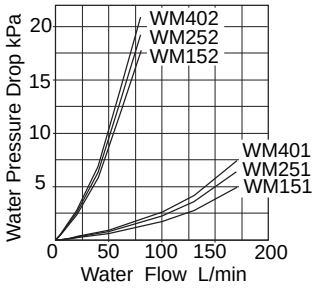
Ratings

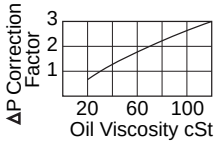
Maximum oil/shell side pressure .....26 Bar.
Maximum water/tube side pressure.....10 Bar.
Maximum oil temperature.....150°C.
Maximum viscosity ..... 80cSt actual.

W SERIES PERFORMANCE



Performance curves are based on ISO 68 oil entering the cooler 40°C higher than the incoming water temperature used for cooling. This is also referred to as a 40°C entering temperature difference (ETD).
For single pass models Oil to Water flow ratio is 1:1
For two pass models Oil to Water flow ratio is 2:1.
DYNACOOL computer selection program is available to size units at other operating conditions.





ORDERING CODES

WM = MARINE - 4" Shell with 1/4" Copper Nickel tubes, aluminium fins, 316SS tube sheet. — **WM 15 1 S S S**

COOLING STACK LENGTH
15 = 150mm - 3/4" BSPP Ports.
25 = 250mm - 1" BSPP Ports.
40 = 400mm - 1 1/2" BSPP Ports.

NUMBER OF WATER SIDE PASSES
1 = Single pass, 2" hose tail and 1 1/4" BSPP.
2 = Two pass, 1" BSPP.

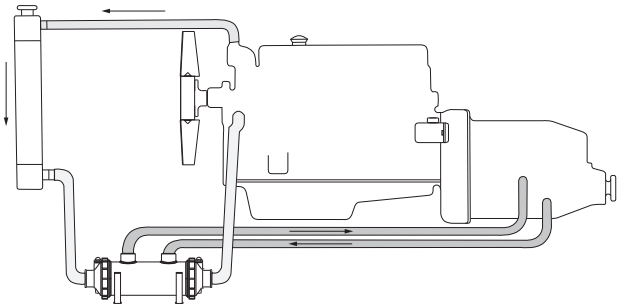
END BONNET MATERIALS
S = Stainless - WM cooler. 1 pass in straight or 90° and 2 pass.
Other materials available upon request. Consult our Sales Office.

END BONNET COMBINATIONS
S = Straight.
N = 90° Elbow - SS316 only - single pass unit only - 2" hose tail.

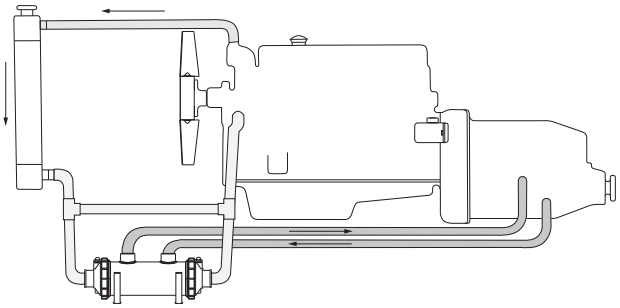
Replacement anode kits for WM series -73/01/05965.

WM COOLER - TRANSMISSION COOLING INSTALLATION

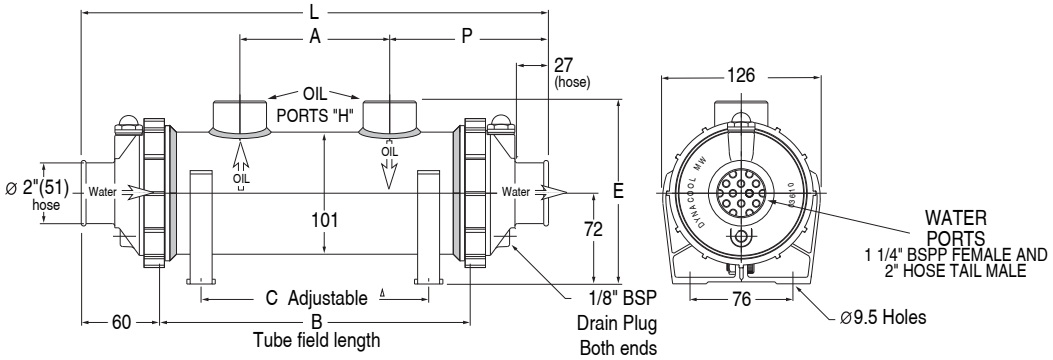
Without bypass water flow less than 250 L/m.



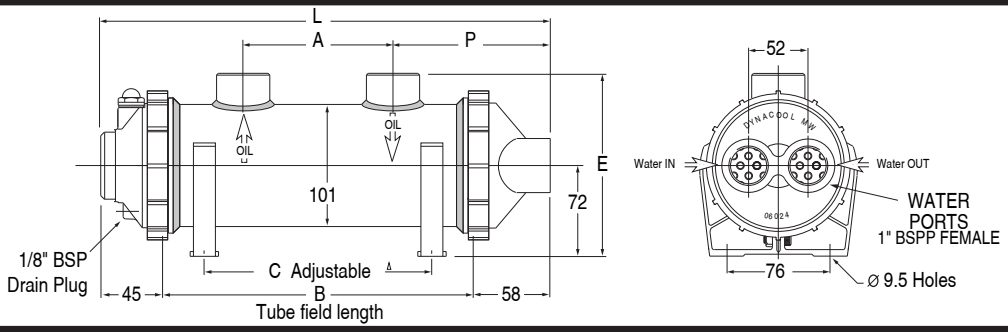
With bypass water flow exceeds 250 L/m.



DIMENSIONS - W SERIES 1 PASS

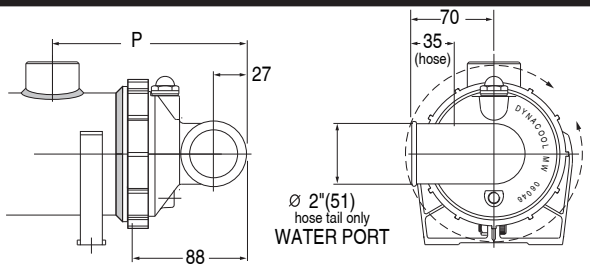


DIMENSIONS - W SERIES 2 PASS



DIMENSIONS - W SERIES 90° END BONNET

90Deg End Bonnet may be rotated to allow hose to be connected from any angle



May be field positioned around 360 deg to suit application.

COMMON DIMENSIONS						Single Pass Models			90° (Both ends)		Two Pass Models			Weight
Model	A	B	C Δ	E	H*		L	P	L^	P		L	P	kg
WM15	75	172	76	148	3/4"	**WM151**	291	108	348	136	**WM152**	275	106	5
WM25	125	272	190	148	1"	**WM251**	391	133	448	161	**WM252**	375	131	6
WM40	200	422	288	154	1 1/2"	**WM401**	542	171	598	199	**WM402**	525	169	9

* All ports are BSPP female pipe thread to ISO 228/1G. Tolerance ± 3mm.
^ Overall length for units that have 1x90° and 1xstraight bonnet is L - 28mm.
Δ Dimension C is factory preset. Mounting feet location may be adjusted to suit your application. Units may also be rotated and clamped allowing mounting in various positions e.g. -floor, wall or ceiling mounting.

TECHNICAL SPECIFICATIONS

Materials

Shell..... Copper.
Tubes..... Copper/Nickel.
Tubesheets..... Copper/Nickel.
End Caps..... Bronze.
Nameplate ..... Aluminium.

Anode available. Part No. **WSANODE 1/8NPT**

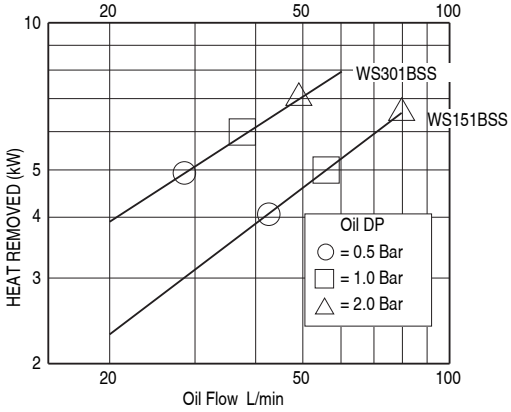
Ratings

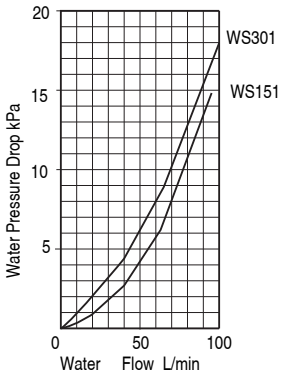
Maximum oil (shell) side pressure.....10 Bar.
Maximum water (tube) side pressure .....10 Bar.
Maximum temperature.....145°C.

Maximum Flow Rates

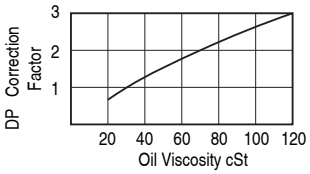
Unit Size	Shell Side l/min	Tube Side l/min
WS151	80	80
WS301	60	80

PERFORMANCE

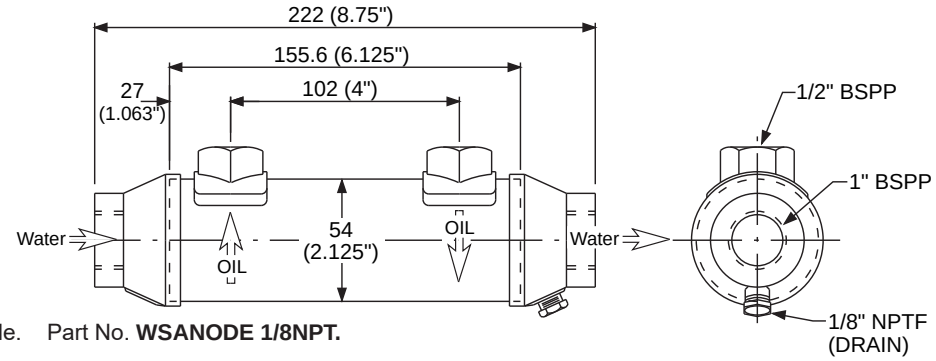




Performance curves are based on ISO 68 oil entering the cooler 40°C higher than the incoming water temperature used for cooling. This is also referred to as a 40°C entering temperature difference (ETD).
DYNACOOL computer selection program is available to size units at other operating conditions.

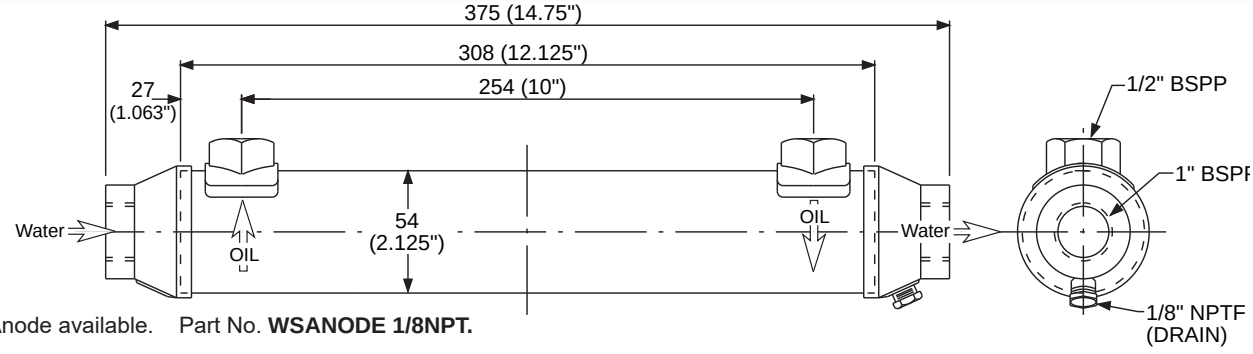


DIMENSIONS - WS151BBS WEIGHT 1.6KG



Anode available. Part No. **WSANODE 1/8NPT.**

DIMENSIONS - WS301BBS WEIGHT 2.1KG



Anode available. Part No. **WSANODE 1/8NPT.**

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

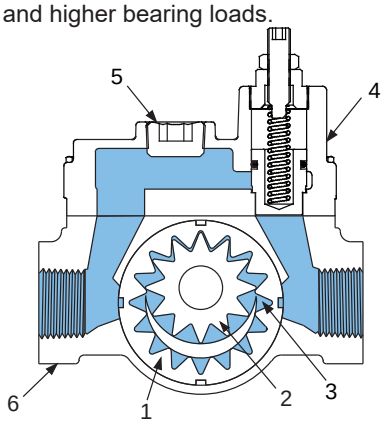
Series U - Universal Pumps

The Universal Pump Design combines the innovation of the Universeal shaft seal, the rugged simplicity of Haight's proven "gear within gear" internal gear configuration, with the flexibility of a bolt-on, integral Relief Valve assembly. This combination of pump features offers pump users unsurpassed flexibility to adapt their pumps to changing system requirements. Universal Relief valve - can be added at any time. Can be used for either suction or return. "Gear within Gear" internal design - since 1937 this design has demonstrated it's effectiveness in a broad range of applications. Universeal shaft seal - the pump can easily be converted from lip to mechanical or packed gland without disconnecting the piping.

Superior High Viscosity Rotary Gear Pumping Features

Input drive at the inner gear provides a built in gear reduction which means less cavitation at standard motor input speeds. The inner gear drive also permits a bearing to be provided on either side of the drive shaft and also provides a balanced rotor. These features make the Haight Pump superior for high viscosity pumping. The same features also offer increased life through lower rotor surface speeds and better bearing support Most other rotary gear pumps have input drive at the rotor which increases risk of cavitation, rotor wear, rotor side load and higher bearing loads.

1. Patented Haight Gear and Rotor for more efficient Positive Displacement pumping.
2. Three Tooth Contact for smoother uninterrupted pressure discharge.
3. Extra Deep Meshing of Gears reduces noise and avoids trapping.
4. New **"Bolt on"** reversible relief valve system for greater bypass versatility and simple field conversion.



As seen from non-shaft end

5. Pipe Plug type auxiliary port for tank return relief or for extra circuit installations.
6. Top quality ferrous metal bodies are standard with Gramix iron bearings.

New **"UniverSeal"** design allows for simple and quick seal replacement or change to an alternative shaft seal type.

SELECTION INFORMATION - STANDARD PUMPS

For pumping high viscosity mineral oils or vegetable oils. The standard models feature cast iron casing and cover components, steel shaft and pinion gear, high tensile iron rotor, self lubrication iron or bronze bearings and Buna-N lip seals. As a general rule, the Cast Iron pump will handle most liquids which have a reasonable level of lubricity providing that the liquid is compatible with ferrous components and shaft seal. These models are usually all available from Australian inventory with or without relief valves.

Pressure Ratings. Pressure rating for standard Buna-N shaft seals is 5.2 BAR for liquids less than 20 cSt and 7 BAR for liquids of higher viscosity not exceeding 1000 cSt. It is normal practice for lip seals to weep a small amount of liquid during operation. For pressures above 7 BAR, special mechanical seals are recommended. Maximum pressure with mechanical seal is 17 BAR.

PUMP DISPLACEMENT Per REV			INPUT POWER kW*	
PUMP SIZE	CC PER REV	Flow @ 1500 RPM L/min	Power @ 1500 RPM Oil 43 cSt	Power @ 1500 RPM Oil 430 cSt
1	3.41	5	0.13	0.24
3	7.20	11	0.13	0.32
5	10.03	15	0.22	0.48
8	18.17	27	0.37	0.63
10	26.12	39	0.52	1.04
15	34.07	51	0.63	1.38
20	43.53	65	0.89	1.45
24	51.85	78	0.82	1.41
30	68.13	102	1.00	1.75
40	89.70	134	1.50	2.16
54	115.17	172	1.70	5.25
80	179.4	268	1.80	5.90

Larger Pump sizes are available up to 750 litres per minute.

*Input power figures are based on use with oil at 50 PSI (350 kPa) pressure and suction at 5 ins HG. When viscosity exceeds the 430 cSt stated above, contact our sales office for revised power requirements.

Temperature Ratings. Temperature limitation for standard pumps is 150˚C with Buna N seals. For higher temperatures a modified standard pump with wider running clearances and Viton, Teflon, Graphoil or Kalraz seals are available.

For Extra Hard, Hatrided Iron Pumps and Corrosion Resistant Pumps in SS or bronze, contact our sales office.

INPUT SHAFT RADIAL LOADING

All of the pump configurations shown below are for direct coupling applications. Where belt or chain drive is used, a special pump with overhung load adapter must be used. Consult sales office for stock options.

VISCOSITY VERSES FLOW RATE AND PUMP SPEED

With the Haight range of rotary gear pumps there is a direct relationship between fluid viscosity and allowable pump speed. Consult table below. The table is based on the use of oil with low levels of abrasive inclusions. Where fluids with high levels of abrasives and/or low levels of lubricity are to be pumped, please consult our sales engineers. During start up operations for brief peak periods, a 12% increase in viscosity is acceptable.

Max Viscosity cSt	Pump Speed RPM
22000	100
5500	250
2500	500
1750	720 to 850
1100	960 to 1150
850	1300 to 1550
650	1750
500 to 25	1800

ROTATION VERSES OIL FLOW

Relief valve type pumps as shown are rigged for clockwise rotation when viewed from shaft end of pump. Pressure port will be A and suction port B. If anti clockwise rotation is required, invert pressure relief assembly and place it in left side of pump. Port B will then become pressure port and port A the suction port. Non relief valve pumps can be run in either direction as delivered. Seal venting is required for this option.

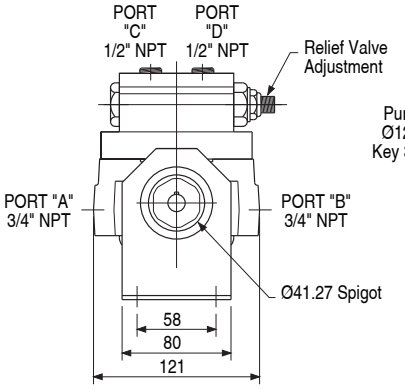
HAIGHT PUMP SIZES 1U, 3U, 5U, 8U WITH OPTIONAL FOOT BRACKETS

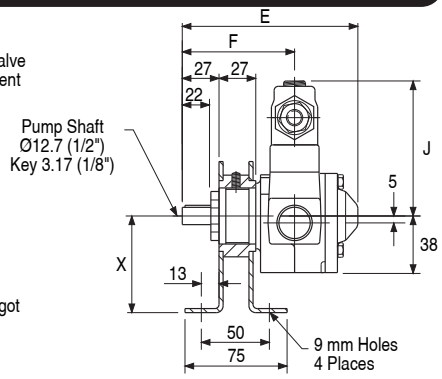
Optional Foot Brackets for Pumps 1U, 3U, 5U & 8U	
Bracket part number	Centre Height X
90/08071F	71
90/08080F	80

Dim 'X' = motor frame size

Pump size	E	F	J	WT kg*
1, 3, 5	130	85	95	4.5
8	151	83	103	5

*Weights are for relief valve pumps

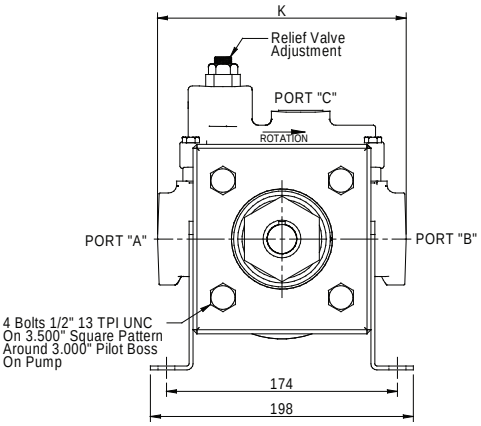


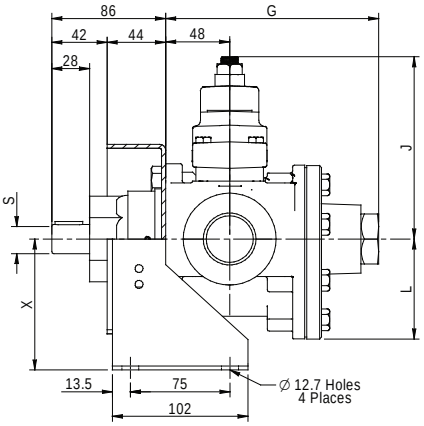


HAIGHT PUMP SIZES 10U, 15U, 20U, 24U, 30U AND 40U WITH OPTIONAL FOOT BRACKETS

Optional Foot brackets for Pumps 10U, 15U, 20U, 24U, 30U, 40U	
Bracket part number	Centre Height X
90/40080F	80
90/40090F	90
90/40100F	100
90/40112F	112
90/40132F	132

Dim 'X' = motor frame size





Pump	Ports A & B	Ports C & D	G	J with R.V.	J w/o R.V.	K	L	"S" Shaft Ø	WT-kg*
10U	1" NPT	1" NPT	157	103	57	178	70	15.87 (5/8" x 0.187" KEY)	13
15U-20U	1 1/4" NPT	1" NPT	157	103	57	178	70	15.87 (5/8" x 0.187" KEY)	14
24U-30U-40U	1 1/2" NPT	1" NPT	169	103	57	187	76	22.22 (7/8" x 0.187" KEY)	15

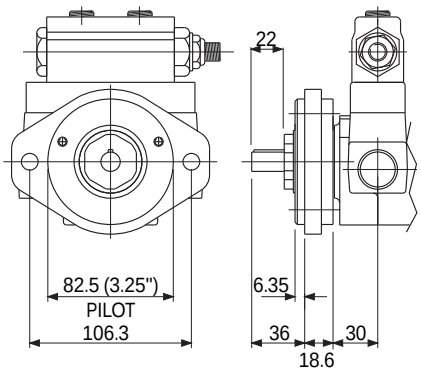
*Weights are for pumps with relief valve fitted.

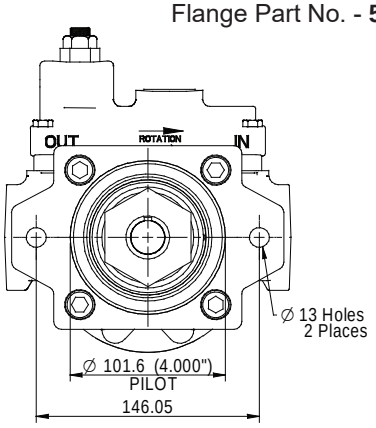
PORTS C & D . These ports can be supplied on all sizes of relief valve type pumps. They are auxiliary ports for pressure gauges, vacuum gauges, or for secondary relief valves. The auxiliary pressure port is always the one at the opposite end to the relief valve adjustment screw. On above drawing the auxiliary pressure port is C. Relief valve units are factory set at 60PSI (4 BAR).

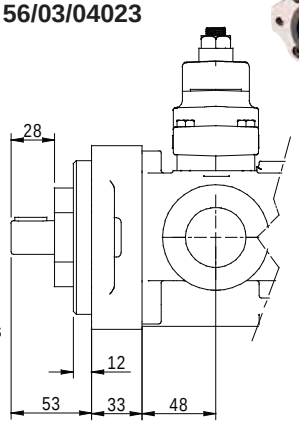
U SERIES PUMP WITH SAE 2 HOLE HYDRAULIC INTERFACING

SAE A Flange
Pump Sizes 1U, 3U, 5U, 8U
Part No - **56/03/06033**

SAE B Flange
Pump Sizes 10U, 15U, 20U, 24U, 30U & 40U
Kit Part No. - 90/04025 (Flange + Bolts)
Flange Part No. - **56/03/04023**



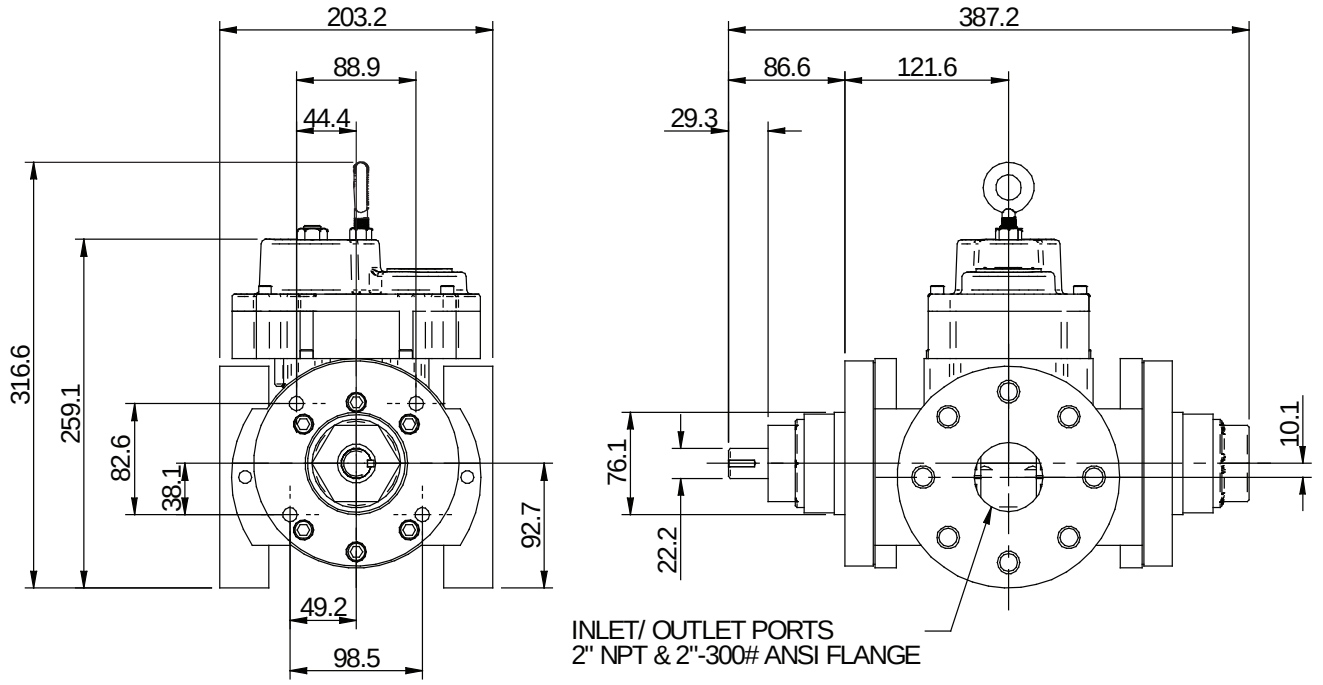




All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Larger Capacity Pumps Available -- Consult Factory

HAIGHT PUMP SIZES 54UR AND 80UR



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Rotary Gear Positive Displacement Pumps
HAIGHT PUMP AND ELECTRIC MOTOR PACKAGES

Haight pump and electric motor packages come complete with pump, electric motor, base plate, flexible shaft coupling and bell housing.

Haight pump and electric motor packages are available with 4 pole 415 volt AC electric motors ranging from 0.55 kW to 4 kW. Units with 6 or 8 pole motors can also be supplied on request as well as single phase 4 or 6 pole motors in sizes to 2.2kW.

The standard motor rating is IP55 class F insulation. Motors with special specifications can also be supplied (eg flameproof).

Electric motor dimensions vary depending on brand. To establish the final dimensions of the assembly use measurement "H" which is the position of the foot mounting bolt at shaft end of the electric motor. Use a manufacturer's drawing of the selected electric motor to establish final dimensions. CAD GA drawings & 3D models are available on request.

MOTOR POWER (kW) & AMPS BY FRAME SIZE

FRAME*	kW at 4 POLE	AMPS	kW at 6 POLE	AMPS
80	0.55 to 0.75	2.0	0.37 to 0.55	1.90
90	1.10	3.0	0.75	2.30
90L	1.50	3.3	1.10	3.00
100	2.20 to 3.00	5.8	1.50	3.80
112	4.00	8.0	2.20	5.30

*To AS1360

ORDERING CODE Part Number — **90H** B / 10 U 6P 220

HAIGHT PUMP ASSEMBLY 90H

PUMP/MOTOR CONNECTION Bell housing B; Bedplate

PUMP SIZE 01 03 05 08 10 15 20 30 40

RELIEF VALVE With relief UR; Without relief U

ELECTRIC MOTOR SPEED 4P 6P 8P (1440 960 720)

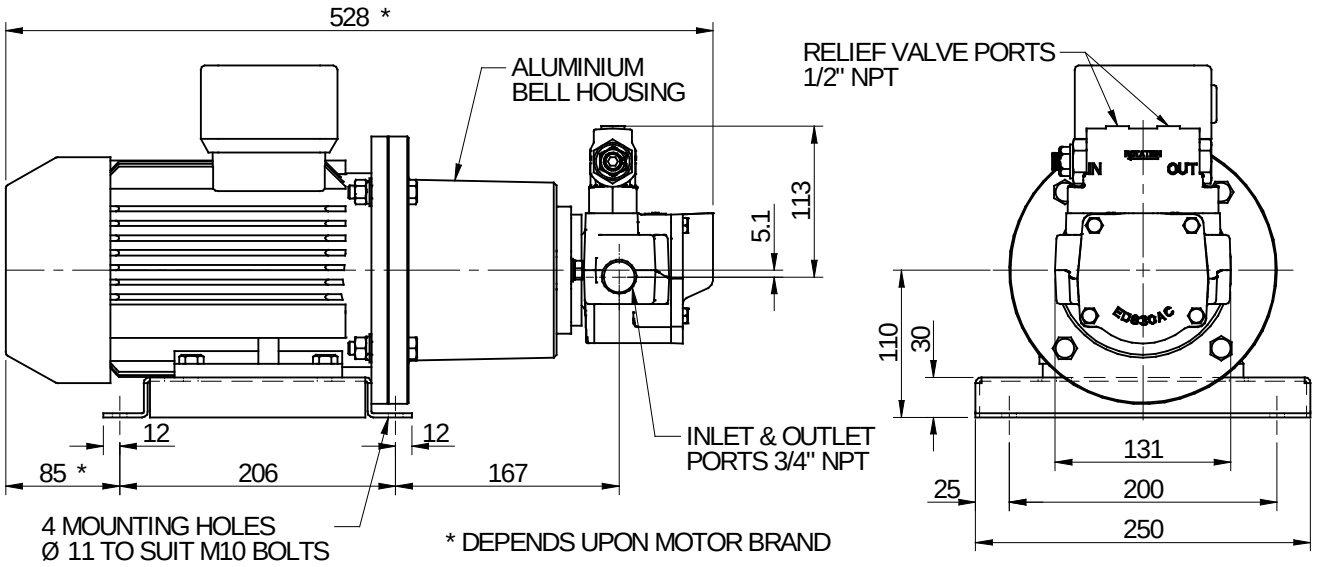
ELECTRIC MOTOR POWER 0.37kW 037; 0.55kW 055; 0.75kW 075; 1.5kW 150; etc

SPECIAL FEATURES (eg S = single phase)

Note: not all combinations available, check with sales office.

MOTOR AND PUMP PACKAGES - SIZE 1 THROUGH 8

Shown with relief valve pump (UR model)
Optional higher pressure springs available.
Also available without relief valve (U model).

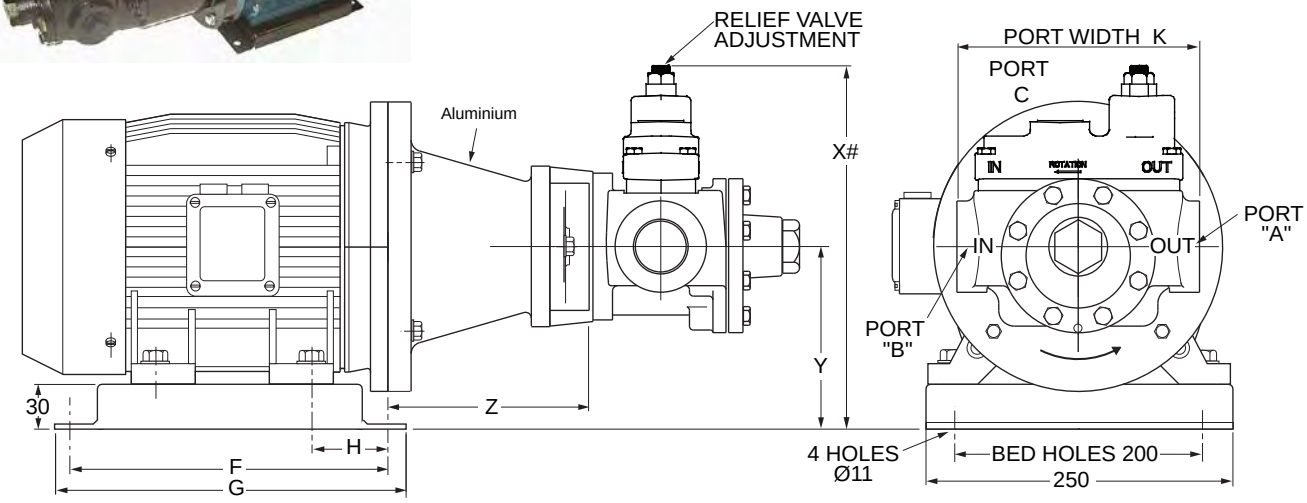


USES AN 80 OR 90 FRAME MOTOR DEPENDENT UPON PUMP SIZE & MOTOR SPEED.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

MOTOR AND PUMP PACKAGES - SIZE 10 THROUGH 80

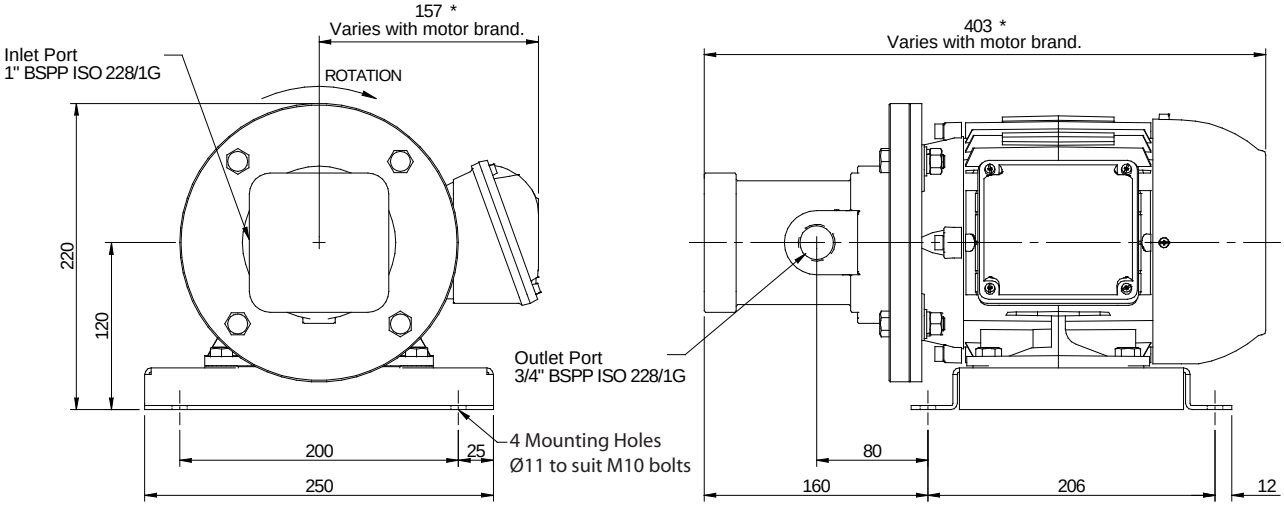
Shown with relief valve pump (UR model).
Optional higher pressure springs available.
Also available without relief valve (U model).



	Sizes 10 through 40						Pump	Ports A & B	Ports C	K
	F	G	H	X#	Y	Z				
80 Motor Frame	206	230	50	213	110	127	10UR	1” NPT	1” NPT	178
90 Motor Frame	206	230	50	223	120	127	15UR-20UR	1 1/4” NPT	1” NPT	178
100 Motor Frame	236	260	48	233	130	139	24UR -30UR	1 1/2” NPT	1” NPT	187
112 Motor Frame	236	260	48	245	142	139	40UR	1 1/2” NPT	1” NPT	187
112 Motor Frame	236	260	48	309	142	139	80UR	2” NPT	-	203

MOTOR AND PUMP PACKAGE - SETTIMA GR40 SCREW PUMP

- Low noise aluminium body screw pump.
- Noise level approximately 65 dBa at 1 meter.
- For low to medium viscosity oil up to 210 cSt.
- Built-in relief valve, 5 BAR. Other pressure ratings available upon request.
- Flow 40 l/min nominal.



All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

APPLICATION

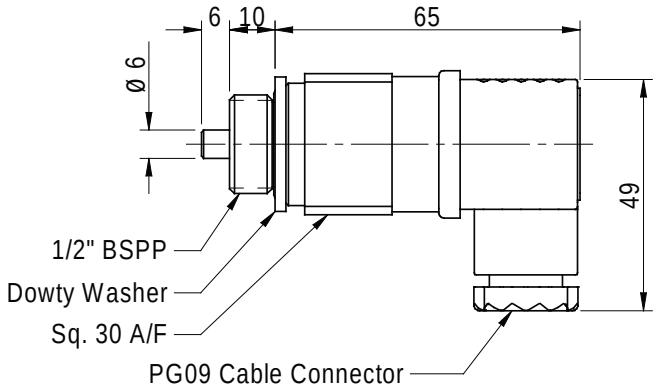
The BMT thermo switch is designed for controlling electric motors. The switch is suitable for use in either 240 Vac or 12/24 Vdc. The switch can be used in 415Vac 3 phase by connecting to the relay side of a three phase contactor.

The thermo switch uses a reliable “snap” action bimetallic disk type switch, which is sealed for life inside a brass bulb well. The switch contacts are Normally Open and silver plated for long life when operated in the range specified. The cable connector is to the PG09 Din 43650 std. The switch bulb has a threaded ½” BSPP male connection and a Dowty seal.

Switches are fixed temperature (not adjustable).

Specifications

Switch rating	-10A/250 Vac - 3A/ 12 or 24 Vdc (use relay for higher current draw)
Max Pressure	- 20 bar
Max Differential Temperature	- 16° C
Max. temp.	- 120° C
Protection	- IP65
Plug Connector	- PG09, DIN 43650
Material	
Body	- Brass
Contacts	- Silver
Thread	- ½” BSPP



BASIC SWITCH	
Order Code	Closing Temperature
17/BMT45WNO	**45°C**
17/BMT55WNO	**55°C**
17/BMT65WNO	**65°C**

DYNACOOL AIR COOLED HEAT EXCHANGER
Auxiliary Port Details for thermoswitch mounting

Heat Exchanger Model	Auxiliary Port Size	Reducer Bush (RYCO)
TM20, TM40	1/2” BSPP	None Req
VC2	1/2” BSPP	None Req
VC4,5 & 6	1” BSPP	S102-1608
VC7 & 8	3/4” BSPP	S102-1208
DC31 & DC32	1 1/4” BSPP	S102-2012 & S102-1208
DC32S	3/4” BSPP	S102-1208
DC33 & DC35	3/4” BSPP	S102-1208

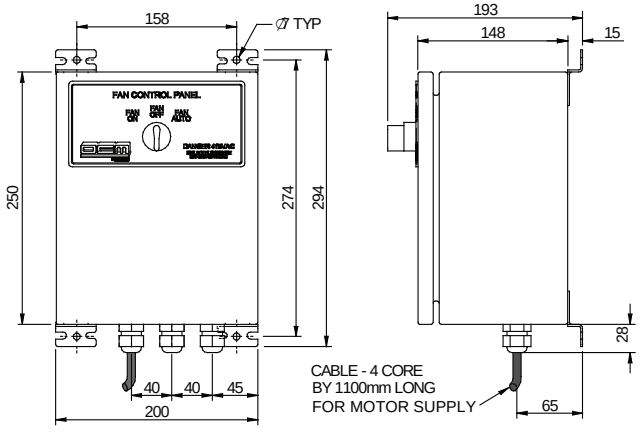
Above reducers are available for purchase from OEM Dynamics.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Heat Exchanger Accessories
3 PHASE THERMOSTATIC CONTROL

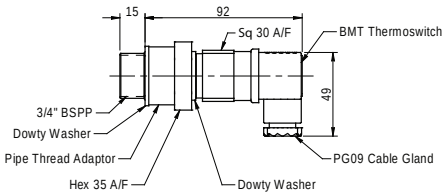
APPLICATION
The thermostatic control circuit is designed for use with 3 phase electric motors primarily switching the fan motor on heat exchangers, other uses include switching control of small pump units. The control circuit can be switched by any 240V thermoswitch or other similar switching device.

FEATURES
The control switch on the junction box is a three position switch with ON OFF and AUTO positions. When switched to the AUTO position the electric motor is controlled by the switching signal from the external thermoswitch (Supplied with kit units). The control circuit features high quality components, robust switch and contactor relay, and wafer type terminals mounted on DIN rail. The junction box has 3 cable glands and is supplied with 1.1 metres of pre wired cable for the electric motor. Enclosure rating is IP66.



KIT with SWITCH and JUNCTION BOX

Order Code	Closing Temperature
17/JB/BMT/45	46°C
17/JB/BMT/55	55°C
17/JB/BMT/65	65°C



Heat Exchanger Accessories
LOW VOLTAGE WIRING KITS - 12V AND 24V DC

GENERAL DESCRIPTION
Wiring harness kits are available for all Versacool & Dynacool low voltage 12V/ 24V DC fan cooler models. Kits include a switch, fuse, fuse holder, port adaptor, relay, wiring and fitting instructions.

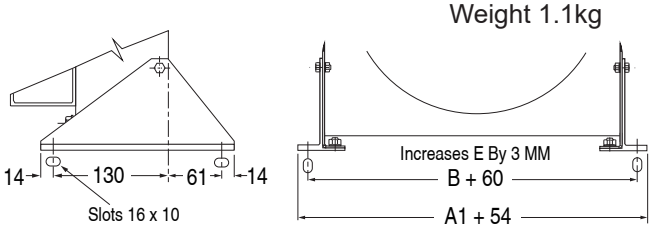
Wiring Harnesses to suit Temp Setting	Part No.	Description
DFM 11&12, VC2-6 single fan coolers		
12 Volt Kits		
55°C	039.8.06172	DFM 11&12, VC2-6 12V Wiring Kit
65°C	039.8.06173	DFM 11&12, VC2-6 12V Wiring Kit
24 Volt Kits		
55°C	039.8.06142	DFM 11&12, VC2-6 24V Wiring Kit
65°C	039.8.06143	DFM 11&12, VC2-6 24V Wiring Kit
DFM22, VC7 & 8 twin fan coolers		
12 Volt Kits		
55°C	039.8.06371	DFM 22, VC7-8 Twin fan 12V Wiring Kit
65°C	039.8.06372	DFM 22, VC7-8 Twin fan 12V Wiring Kit
24 Volt Kits		
55°C	039.8.06369	DFM 22, VC7-8 Twin fan 24V Wiring Kit
65°C	039.8.06370	DFM 22, VC7-8 Twin fan 24V Wiring Kit

Other temperature settings are available on request.

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

MOBILE BASE KIT

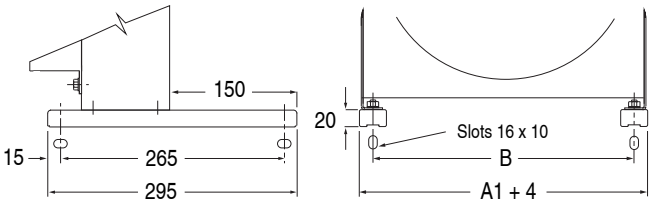
Weight 1.1kg



Ordering details
Model VC2 **Part No. 039.8.04590**
Models VC4 thru VC8 **Part No. 039.8.04563**

UNIVERSAL BASE KIT

Weight 0.76kg

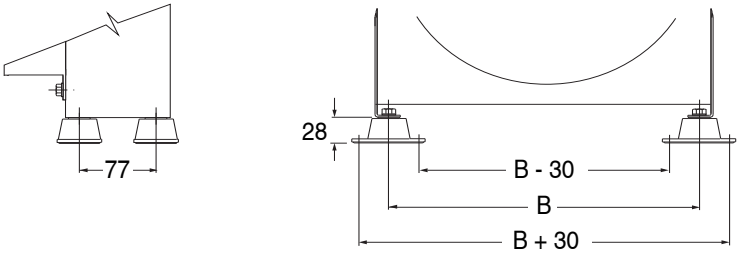


Ordering details
Models VC2 thru VC8 **Part No. 039.8.04465**

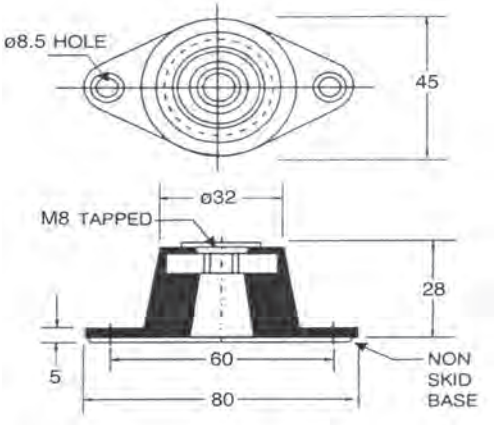
ANTIVIBRATION MOUNTINGS

Recommended for mounting of Versacool units in areas where they may be subjected to harmful vibration.

These antivibration mounting feet are used to protect the cooler from harmful vibration and to reduce noise associated with vibration. The antivibration mounts can be used in conjunction with the universal base kit or mobile base kits.



Typical installation to basic cooler



Ordering details
Set of 4 antivibration feet + mounting screws **Part No. 039.8.05528**

DEBRIS SCREEN

A debris screen can be fitted to our range of Versacool & Dynacool range of air cooled heat exchangers. On the Dynacool range, the debris screen replaces the standard wire mesh core guard.

The debris screen consists of an aluminium frame with SS mesh. Finish is polyester powder coat “black”.

The debris screen can be removed for cleaning without removing the heat exchanger core element.

Contact our sales office for further details.

ACCESSORIES

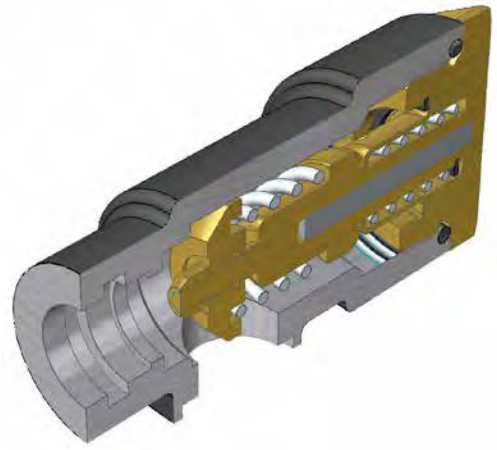
All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

Thermal and pressure bypass system

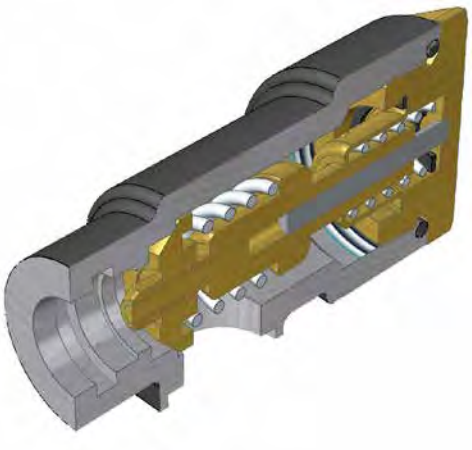
- The thermal bypass diverts cold oil around the core reducing system pressure and allows the oil to reach optimum temperature sooner. Once warm, the thermal bypass closes and the pressure bypass provides relief if the pressure setting is reached.
- Bolt on design with new style heat exchanger core.
- No loss of core area like some competitors designs.
- Can be placed on either side to suit operational requirements.
- Can be fitted in the field with a suitably equipped core.
- Fits VC4-7 range with all parts standard across the range (cross tube length varies with model).
- Economical, corrosion resistant materials, primarily aluminium alloys.
- Engineered 'O' ring seals at all joints.
- Core and bypass assembly can be retrofitted to older style VC4 -7 heat exchanger case assemblies.

Valve Assembly

- Thermal Bypass shift 50°C, full moved at 60°C.
- Pressure bypass 4 BAR.
- Wax Element style thermo-valve.
- Optionally, can be made into pressure or temperature only valve.



Thermal element operation at full open position
Allows bypass of cold thick oil.



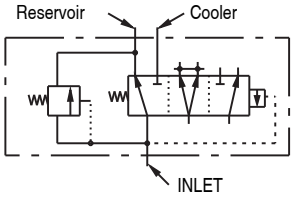
Thermal element fully closed.
Pressure bypass operational.

Part Numbers for retrofitting older style air heat exchangers (both parts required)

Cooler Model	VC4X & VCL4X	VC5N & VCL5N	VC6X & VCL6X	VC7X & VCL7X
Individual part Numbers				
New Core Part No.	18/07804	18/07805	18/07806	18/07807
Bypass Kit Part No.	B04504	B05504	B06504	B07504
Core & Bypass Kit Full Part No.	**18/07804B504**	**18/07805B504**	**18/07806B504**	**18/07807B504**

Heat Exchanger Accessories
THERMAL BYPASS ASSEMBLY

Graphic Symbol



This thermal bypass valve is ideally suited for hydrostatic drive circuits which require fast warm-up, controlled fluid temperature, and low return line back pressure. When installed in the return line of a hydraulic circuit that employs an oil cooler, this device will modulate fluid temperature by either shifting return line flow through the cooler, or bypassing directly to the reservoir. In addition, a built-in pressure relief function automatically relieves excess pressure to the reservoir should the cooler become restricted and resultant pressure drop become too high for the cooler circuit.

FEATURES:

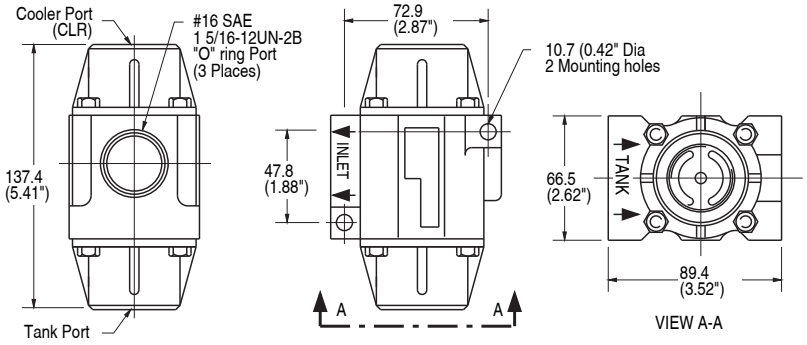
1. Operating Characteristics:
- A. Mode #1: At temperatures below the shift temperature oil flows from inlet to tank port.
- B. Mode #2: At temperatures between the start of shift & full shift the flow from the inlet port is divided between the cooler & tank ports.
- C. Mode #3: At temperatures above the full shift temperature inlet flow is through cooler port.
- D. Mode #4: At temperatures above the full shift temperature the excess pressure is relieved through the tank port.

2. Standard Shift Temperatures: 100°F(38°C). 120°F (49°C) 140°F (60°C) and 160°F (71 °C).
3. Full Shift (Cooler Port Open) Temperature: Shift temp plus 25°F (14°C).
4. Relief valve setting: 65 psi (4.5 bar). Consult factory for other settings.
5. Maximum Operating Pressure: 250 psi (17 bar).
6. Proof Pressure: 300 psi (21 bar).
7. Minimum Burst Pressure:
- A. Up to the full shift temperature: 325 psi (22 bar).
- B. Above the full shift temperature: 600 psi (41 bar).

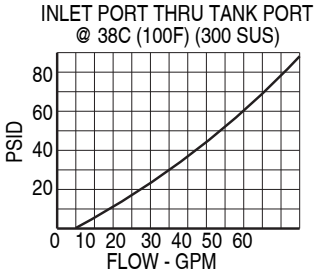
8. Minimum Operating Temperature: -30°F (-34°C).
9. Maximum Operating Temperature: Shift temperature plus 75°F (42°C).
10. Maximum Flow Rating: 60 gpm (227 l/m).
11. Leakage @ 250 psi (17 Bar) and 60 gpm (227 l/min) Inlet Flow:
- A. Cooler Port:
  1. 0.5 gpm (2 l/m) maximum up to 5°F (3°C) before shift temp.
  2. 1.0 gpm (4 l/m) maximum from 5°F (3°C) before shift to shift.
- B. Tank Port: 0.10 gpm (0.4 l/m) maximum.

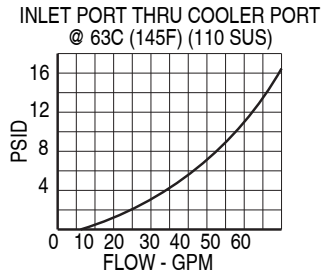
12. Operating Fluid: Mineral base hydraulic fluids.
13. Construction: Aluminium die-cast housing.

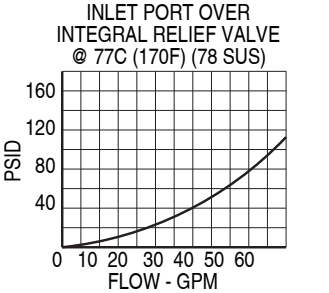
DIMENSIONS - Thermal Bypass



PRESSURE DROP

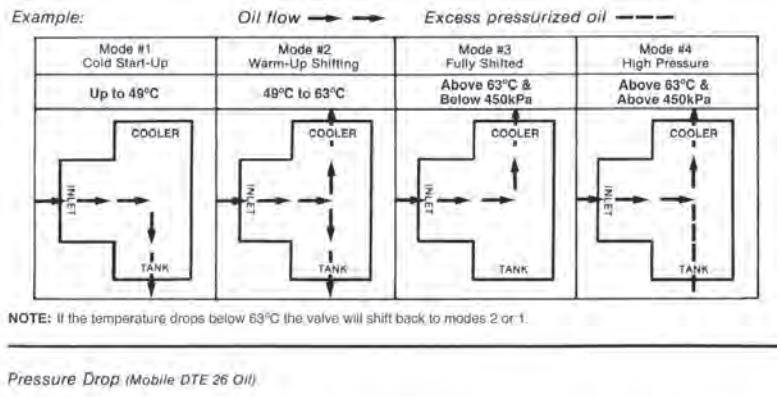






Based on Mobile DTE 26 oil
Note: Pressure drop shown is added to relief valve crack pressure for total pressure drop.

MODE EXAMPLES



ORDERING INFORMATION

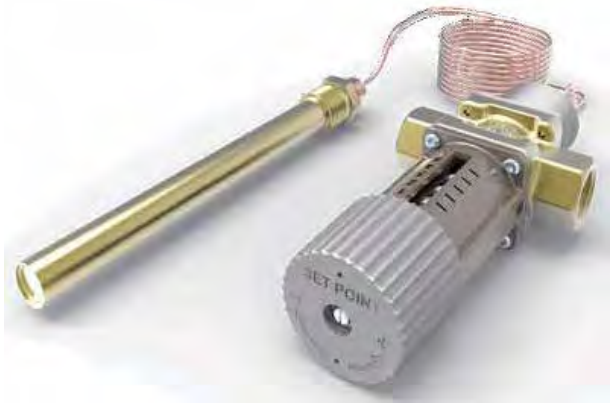
Part No	Shift temperature	Part No	Shift temperature
65/65654	38°C (100°F)	**65/65656**	60°C (140°F)
65/65655	49°C (120°F)	**65/65657**	71°C (160°F)

All dimensions in mm unless noted otherwise 0-50 are ± 1. 50-1500 are ± 3.

ACCESSORIES

Application

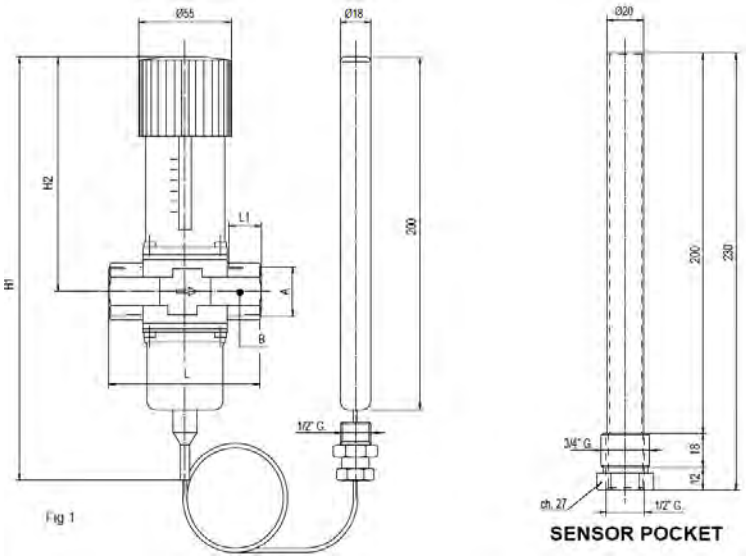
Self-acting AVTA cooling water valves are widely used for temperature regulation in many different machines and installations where cooling is a requirement.
AVTA always opens to admit flow on rising sensor temperature.



SPECIFICATIONS

VALVE :
- Opens on rising sensor temperature ;
- Media temperature from : 25 to 130°C ;
- Differential pressure : 0-10 bar
- Max. test pressure : 25 bar
- Max. Pressure on sensor : 25 bar ;
- The valves are pressure- relieved, i.e. the degree degree of opening is not affected by differential pressure Δp (pressure drop).

SENSOR :
- Sensor dimensions : Ø18x210 mm.
- Sensor can be installed colder or warmer than the valve.
- Sensor must be orientated as shown in fig.2.
- Max Pressure on sensor : 25 bar.
- Capillary tube length : 2 metres.
- Temperature adjustment range : 25 - 65°C
- Max. Sensor Temperature : 90°C



TYPE	H1	H2	L	L1	A	B	Kg
AVTA 10	240	133	72	14	3/8" G	NV 27	1,45
AVTA 15	240	133	72	14	1/2" G	NV 27	1,45
AVTA 20	240	133	90	16	3/4" G	NV 32	1,50
AVTA 25	250	138	95	19	1" G	NV 41	1,65

Installation

VALVE :
Mount the valve in such a way that flow is in the direction indicated by the arrow on the valve body.
The valve body can be mounted in any positions.
Insert a filter in the pipe system ahead of the valve.
CAPILLARY TUBE :
Install the capillary tube without sharp bends.
Relieve the capillary tube at the ends.
Relief is especially important where vibrations can occur.
NOTE
The sensor must, when the plant is started, be able to sense variations in the temperature of the cooling water.
Therefore a by-pass line with shuttoff valve may be necessary to ensure a flow at the sensor during start up, when the valve may be closed.

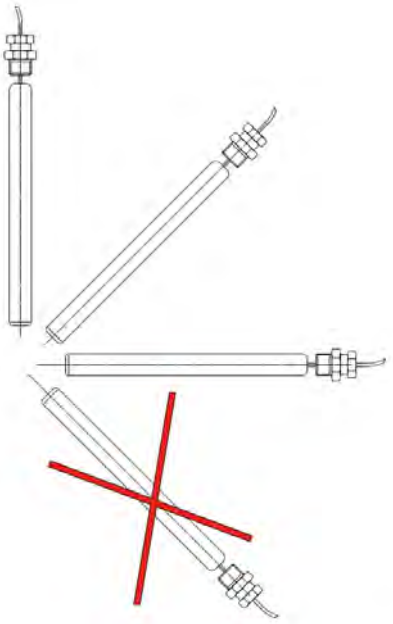


Fig.2

Heat Exchanger Accessories
THREE - WAY THERMOSTATIC VALVE

- Flows up to 490 L/min.
- Standard Ports 2” NPT (Opt. 1/2”, 3/4”, 1” & 1 1/2”).
- Flanged Ports Optional 3”, 4” & 6”.
- Opening Temp range from 21° to 102° C.
- Max. Operating Pressure of 10 Bar (145 PSI).
- Max. Operating Temperature. Full Shift Temperature + 23°C

General Description Three way thermostatic valves use the principle of expanding wax. A self contained power element activates a stainless steel sliding valve which provides a positive three way action. All temperature settings are factory set. Elements are field replaceable, hence valves can be altered to operate at a different temperature range or refitted with new elements of the same setting.
During cold start up, total flow is through the by-pass port. Once the fluid temperature reaches the opening point, the valve begins to open and flow to the heat exchanger supply port begins. As the temperature rises the valve shifts further allowing more flow through the heat exchanger supply port and less to the by-pass port. When the fully shifted temperature is reached the valve is fully stroked and all flow is directed to the heat exchanger port.
Valves can be used for oil or fresh water service.
Housing - Cast Iron (optional steel or bronze).
O-Rings - Viton (optional, Buna N).
Valve - Alloy steel.
Applications Three way thermostatic valves may be installed for either “mixing” or “diverting” modes of operation and can be mounted in any plane and with port orientated in any direction.
When installing in mixing mode, the valve must be located on the cold side of the application. Hot liquid will be mixed with cooled fluid to discharge liquid at proper temperature. Select a valve with opening point at, or just above, the minimum desired oil operating temperature.
For diverting mode, the valve must be installed on the hot side of the application. Cold liquid will be bypassed until the system warms up, then flow is directed to the heat exchanger. Select a valve with full shift point at, or just below, the maximum desired oil operating temperature.

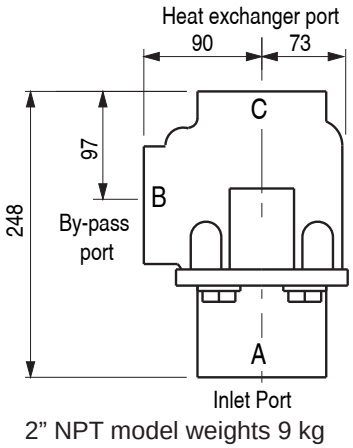
THREE - WAY ORDERING CODES
65/ 66041 / 43/54

Code	Part Type
66041	Complete valve
67818	Element only

Code	Opening Point °C	Fully Shifted °C
21/24	21	24
29/41	29	41
38/47	38	47
43/54*	43	54
51/60	51	60
57/66*	57	66
63/71	63	71
66/74	66	74
68/78	68	78
71/79	71	79
74/82	74	82
79/88*	79	88
87/98	87	98
93/102	93	102

*** Common stocked settings**

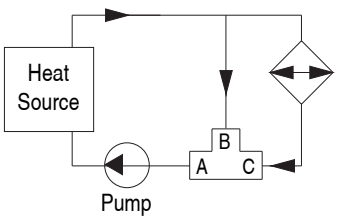
2” NPT All ports female thread.
Warning: 0.5 Bar (7 PSI) ΔP across valve Ports.



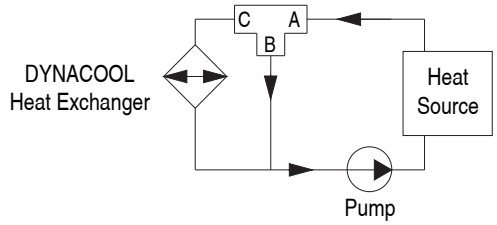
2” NPT model weights 9 kg

PRESSURE DROP TABLE (Bar)

Flow	Oil Viscosity (cSt)				
L/min	255	180	115	85	water
190	0.12	0.12	0.10	0.08	0.07
285	0.24	0.21	0.17	0.15	0.13
380	0.42	0.38	0.33	0.30	0.26
475	-	-	-	-	0.44
max. flow (l/min)	405	425	445	465	490



MIXING Applications



DIVERTING Applications

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Determining The Level Of Heat Load In Oil Circuits.

Heat is generated through energy being wasted in the form of inefficiency. Heating in a oil circuit is usually a by-product of motive power which may be some form of engine or motor or a device such as a brake or clutch which converts rotating energy into heat energy in the oil.

Another source may be by conduction, convection or radiation from either direct solar energy or any other external parasite source.

In a hydraulic system, the main energy source is usually the input power entering the hydraulic pump from the engine or motor. Some portion of the input power will be wasted through inefficiency (friction and pressure losses) and will be evident as heat in the oil.

The degree of inefficiency in the circuit may be established by combined analysis of the known efficiency of the circuit components. More frequently it is established by making an estimate based on previous experience with the type of circuit being considered.

Typical hydraulic system circuits range in efficiency from between 80% down to 40% efficient. High efficiency pumps and motors combined with ample plumbing may deliver up to 80% efficiency. Gear pumps with gear motors or gear pumps with gerotor motors may be less than 50% efficient.

The heat load required to be removed from the system will be equal to the total inefficiency in the system, less the existing thermal heat transfer capacity of the system.

So with a circuit estimated to have a power input of 50 kW and an efficiency loss of 30%, there can be expected to be a requirement to cool 15 kW of heat. The components in the circuit may be able to dissipate some heat so the heat load required to be cooled with a heat exchanger will be something less than 15 kW.

Power, Heat and Oil Flow Relationships.

In the above example we determined that we need to remove 15 kW from a circuit. Now what does 15 kW really mean in terms of heat. The following are formulae which can be used with hydraulic mineral oils to provide relationships between power, heat and oil flow.

1 $\Delta T\ °C = \frac{kW \times 34.5}{L/min}$ **2** $kW = \frac{L/min \times \Delta T\ °C}{34.5}$

3 $L/min = \frac{kW \times 34.5}{\Delta T\ °C}$

L/min = Oil flow in Litres per minute.
ΔT °C = Entering temp of oil minus exit temp of oil.

Applying formula **1** to the above example with oil flow at 100 L/min we get the following result.

$$\frac{15 \times 34.5}{100} = 5.2$$

So we require a constant reduction in temperature of 5.2°C in our oil to dissipate 15 kW for 100 L/min.

Oil and Air Temperature Relationships.

For the cooling of oil with a air cooled heat exchanger it is obviously necessary to have the air temperature cooler than the entering oil temperature. The temperature difference between the entering oil and the entering cooling air is called the ETD (entering temperature difference).

The larger the ETD the easier it is to cool the oil and by definition the smaller the air cooled heat exchanger will be. For purposes of sizing a suitable heat exchanger, it is usual to set the inlet temperature of the oil at the maximum temperature the system is required to operate at.

Oil temperatures in modern hydraulic systems are preferred to be maintained in the 60°C to 70°C range. The temperature of the cooling air will be the ambient temperature of the air in the locality where the system is to be used.

Selection of The Exchanger By Performance

In this catalogue, performance shown on graphs is usually expressed in kilowatts per degree °C of entering temperature difference between the oil and the cooling air (kW/°C).
So if the ambient temp is 30°C and the oil temp is required to be 60°C, a 15 kW heat dissipation would require a oil cooler capable of 0.5 kW/°C at the required oil flow.

Computer Model Selection Program

We provide complete performance graphs for most models of our air cooled heat exchangers. However, for accurate sizing we recommend the use of our computer model selection program which covers almost all of our standard models of air cooled and water cooled exchangers. The program operates on most PC computers under Windows.

Electronic Drawings Of Heat Exchangers

Our computer model selection program now also includes electronic drawings of most models. These drawing are available in DXF format for customer use.

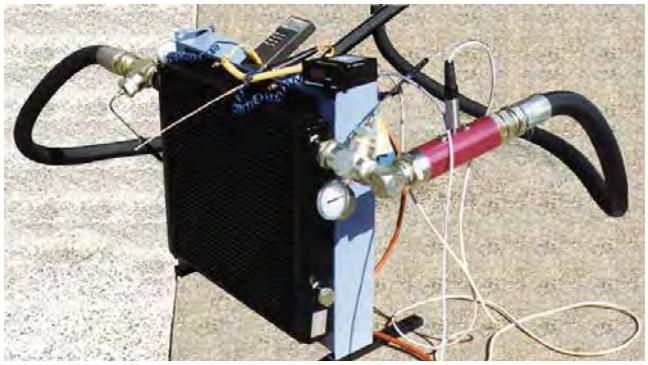
Heat Load Based on Temperature Rise Over Time

Example:

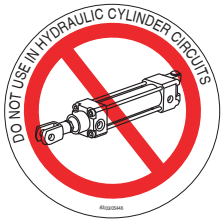
Initial oil temp	20°C
Final oil temp	85°C
Time for temp rise	35 minutes
System oil volume	240 litres
Oil heat capacity	1.72 kJ/L°C

$$\text{Heat Load} = \frac{240 \times 1.72 \times (85-20)}{35 \times 60} = 12.8\ kW$$

Dynacool have produced Air Cooled Heat Exchanger Packages for oil cooling since 1975. Since that time many hundreds of model variations have been produced. Dynacool are acknowledged as leaders in manufacture and industry know how with air cooled heat exchangers for oil cooling. Our products are designed in Australia and our published data is developed through actual test facilities at our Ballina plant in NSW. Our R & D activities include heat transfer design, performance testing and evaluation, pressure drop testing, noise level monitoring and cooling air delivery measurement. Our test facilities enable us to carry out accurate design analysis which results in the constant improvement in our product and provision of accurate data for our publications. Our Dynacool "A" series packages and our recently developed Versacool line command high respect in the heat exchanger market. We also offer a number of other types of air cooled heat exchangers utilising element materials other than aluminium.



Air Cooled Exchanger Rigged For Full Status Testing



Noise Levels Of Air Cooled Heat Exchangers

It is a fact of life that air cooled heat exchangers utilise fans to move air through the cooling matrix. High performance air cooled heat exchangers tend to have dense cooling surfaces and require relatively high levels of air movement under static pressure to achieve performance.

We are now publishing measured noise levels for our air cooled models. The measurement is dB(A) @ 1 metre. For the record, our method of measurement is to take a number of A weighted samples at 1 metre distance from the product at prescribed positions and publish the highest noise level found among the samples. The result approximates that which an inspector will get when he tests on site by survey using AS1217.5.

On any electric air cooled heat exchanger, the noise level will closely relate to the speed of the tips of the fan blades. We publish fan diameters and motor speeds so it is easy for our customers to calculate tip speed. So if you are comparing our product with one of our competitor's products and note his published sound levels are lower than ours then please compare the fan tip speeds.

It is generally the design policy of Dynacool to use smaller diameter more efficient fans than our competitors as well as our SAMS (Superior Air Management System) which reduces fan diameters. Therefore, we claim that relative to size and performance our air cooled heat exchangers generally have lower noise levels than our competitors.

Application Warnings - Aluminium Cooling Elements

The furnace brazed aluminium cooling element has the highest heat transfer efficiency to cost ratio of all oil cooler types. However, care should be taken in making sure that the product is suitable for the application. The following advice applies to all makes of aluminium cooling elements.

OVER PRESSURE.

Never exceed rated operating pressures. Actual failure may take place at 40% to 60% above rated pressure. On hydraulic circuits under starting conditions in winter with cold oil, pressure drop figures may exceed 10 times those calculated for normal operation. If the hydraulic circuit is capable of pressures exceeding the cooler rating, a failure will occur unless a suitable relief valve is provided to bypass the cooler under these conditions.

PRESSURE CYCLING AND SPIKES.

Do not install aluminium oil cooler elements in circuits where sudden changes of pressure or oil flow are likely to occur. Eg:- Cylinder circuits or circuits with oscillating valves. Use of this type of cooler in such circuits will result in rupture of the tubes or cracking of tube to header joints. Aluminium is also subject to fatigue failure under high frequency pressure and/or temp cycling. Bypass relief valves or accumulators are not effective against pressure spikes. For these applications requiring off-line cooling, refer to pages 32-35 for heat exchangers fitted with either a coaxial pump unit or a pump/motor assembly..

HAZARDOUS ENVIRONMENTS.

Aluminium has autogenous sparking capability when impacted with iron or steel. For this reason aluminium is not permitted within coal mines in Australia.

Installation Of Air Cooled Heat Exchangers

Plumbing. Unless approved by Dynacool, use flexible rubber hoses for connection. The hose size should be the same size or greater than the port thread size. Solid steel pipes are not recommended as they may place excessive loads on the core element. If long hoses are used support them as close to the ports as possible. Threaded connections must be fully sealed. We recommend BSPP o-ring face seal type fittings. Should oil be permitted to leak it may cover the core fins and result in the collection of dust and sludge which reduces cooling performance.
Note. Do not fit steel fittings to aluminium ports without lubrication as they may bind and damage the port.

Site Location And Environment. Some cooling elements resist corrosive attack better than others, please consult our Engineering Dept. for details of suitability if a corrosive environment exists. For best heat transfer performance, determine the usual direction of air flow at the site and face the cooling element towards the incoming air flow without restriction from objects at air inlet or outlet. The unit should be bolted down through the base slots provided.

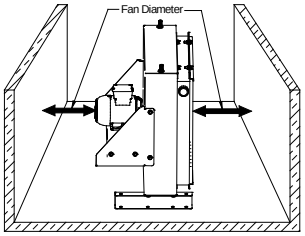
Positioning In The Circuit. In hydraulic circuits, the cooler should always be positioned to receive return oil from the circuit. Do not install the cooler in the pressure circuit. Care should be taken to select a oil source which passes oil at a constant flow rate not exceeding maximum recommended. If operating viscosity is likely to exceed 100 cSt consult our sales dept. Unrestricted oil flow path must be maintained from the outlet oil port of the cooler into the oil reservoir.

DC Electric Motor Connections. Ensure the voltage supply matches that of the cooler. Wire the supply to the 2 pin connector with polarity as shown in the diagram provided in the installation instructions. Start the motor and check the direction of fan rotation, a decal shows the correct direction. All fans should pull the cooling air through the cooling element and discharge it through the fan guard. For Versacool refer to separate instruction forms VC03, VC04 or VC05 if thermostatic controls are to be fitted.

AC Electric Motor Connections. Remove motor junction box and carefully check instructions on wiring which may be displayed inside or outside of junction box. Electric motors of various brands are used , some motors have star connections and others may be wired delta. After wiring has been completed start the motor and check for rotation of the fan. Rotation is usually c/w when viewed from the motor or ac/w when viewed from element. The fan should pull the cooling air through the cooling element and discharge it through the fan guard. All AC electrical wiring should be carried out by a licenced electrician.

Hydraulic Motor Driven Fans. Some units are supplied fitted with Hydraulic fan motors. Hydraulic Motors fitted as fan drives must be piped to permit the fan to rotate freely after the oil flow has been shut off to the motor. Failure to provide such a device may cause the fan to be damaged due to shock loads caused by fan inertia.

Clearance Around Heat Exchanger. There should be one fan diameter clearance in front and the rear of the heat exchanger to provide adequate air flow to the heat exchanger.



Maintenance

Continued efficient operation of the air cooled heat exchanger is dependent on the heat transfer surface being kept clean. In dirty conditions the core element should be cleaned frequently to remove dust and dirt. Should the fins be blocked with oil saturated dirt, use a petroleum based cleaning fluid followed by water sprayed from a medium pressure hose. Do not use high pressure hoses for cleaning heat exchangers with aluminium fins.

CAUTION. DO NOT USE CAUSTIC BASED FLUIDS FOR CLEANING ALUMINIUM COOLING ELEMENTS.

PERFORMANCE CORRECTION FOR AIR DENSITY (TEMPERATURE AND ELEVATION)

AIR TEMP. °F (°C)	ELEVATION ABOVE SEA LEVEL - FEET (METERS)								
	0	1000 (305)	2000 (610)	3000 (914)	4000 (1219)	5000 (1524)	6000 (1829)	7000 (2134)	8000 (2438)
70 (21.1)	1.00	0.97	0.94	0.91	0.88	0.86	0.83	0.81	0.78
80 (26.7)	0.99	0.96	0.93	0.90	0.87	0.85	0.82	0.80	0.77
90 (32.2)	0.97	0.94	0.91	0.89	0.86	0.83	0.81	0.78	0.76
100 (37.8)	0.96	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75
110 (43.3)	0.94	0.91	0.89	0.86	0.83	0.81	0.79	0.76	0.74
120 (48.9)	0.93	0.90	0.88	0.85	0.82	0.80	0.77	0.75	0.73
130 (54.4)	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.72
140 (60.0)	0.90	0.88	0.85	0.83	0.80	0.78	0.75	0.73	0.71
150 (65.6)	0.89	0.87	0.84	0.81	0.79	0.77	0.74	0.72	0.70

Heat Transfer Performance At High Oil Viscosity

Air cooled heat exchanger performance and flow capacity will degrade rapidly when oil operating viscosity exceeds 100cSt. Consult the chart inside the back cover to establish operating viscosity of your application. Please check with Dynacool before selecting heat exchangers for use with high viscosity oil.

PERFORMANCE REQUIREMENTS
Air Cooled Heat Exchanger

Company: _____ Date:_____

Address: _____ State: _____

Phone: _____ Fax: _____

Contact: _____ Ref:_____

The following information is required to select an air to oil cooler.

1. Heat load: _____ kW _____ or hp
2. Oil flow rate: _____ L/min
3. Oil type: _____ (eg ISO68)
4. Maximum desired oil temperature: _____ °C
5. Maximum allowable oil pressure drop: _____ Bar _____ or PSI
6. Cooling ambient air temperature: °C
7. Motor data: 12V - 24V - 240V - 415V - Hyd - no motor.
8. Maximum envelope: _____ H _____ W _____ D
9. Air face velocity (mobile cores only types): _____ m/s.
10. Maximum pressure cooler will be subject to: _____ Bar.

Advise if there are any cylinders or other pressure spike producing components in the cooler circuit.

If unsure of the values required the following information will help. Each number below corresponds to the number above.

1. Heat load: the heat load may be determined by:

A. Hydraulic oil cooling: Assume 30% of the input power will be rejected to heat. If the input power is unknown, this formula may be used: $kW = \frac{\text{(system press. Bar) x (L/min flow)}}{} \times 0.00167$

B. Hydrostatic oil cooling: Assume 25% of the input power will be rejected to heat.

C. Heat load test: the heat load can be determined by actually measuring the degree temperature rise from a cold start-up. This temperature rise is the exact amount of heat going into the oil. To run a heat load test, disconnect any heat exchanger in the test loop. Record the increase in oil temperature every 5 minutes. Review the data received, and determine the greatest temperature rise in any 5 minute period.

$$\text{Heat load} = \frac{\text{system volume x oil heat capacity x } (\Delta T \text{ oil temperature rise})}{\text{5 minutes x 60 sec./min}}$$

For example -
Initial oil temp..... 40°C
Final oil temp ..... 50°C
Time for temp rise..... 5 minutes
System oil volume ..... 240 litres
Oil heat capacity ..... 1.72 kJ/L°C

$$\text{Heat Load} = \frac{240 \times 1.72 \times (50-40)}{5 \times 60} = 13.8 \text{ kW}$$

2. Oil flow rate: This is simply the flow rate of the oil circulating through the cooler.

3. Oil type: Advise oil grade or viscosity vs temperature details

4. Oil temperature: Oil coolers are typically sized using the maximum desired oil temperatures. Typical temp. ranges are:

Hydraulic oil.....43 - 54°C
Bearing lube oil.....49 - 71°C
Hydrostatic drive oil.....54 - 82°C
Lube oil circuits .....43 - 54°C

5 Oil pressure drop: Most systems can tolerate a pressure drop through the heat exchanger of 1.5 to 2 Bar. Excessive pressure drop should be avoided. Care should be taken to limit pressure drop to 0.3-0.5 Bar for case drain applications where high back pressure will blow out pump shaft seals.

6. Cooling air temperature: This is the temperature of the air entering the cooler, also referred to as the ambient air temperature. A normal maximum air temperature is usually between 32°C to 38°C. Care should be taken not to install in confined space as ambient temperature will increase and cause overheating.

7. Motor data: Most models are available with a wide variety of motors. List as desired. Be sure to indicate any special requirements.

8. Envelope size: This may be any height, width and depth depending on the application. Allowances should be given so as not to obstruct fan air flow.

9. Air face velocity/cooling air flow: Typically oil coolers are sized for 5.5m/s (20 kph) air velocity. When an air volume flow is given in m^3/s, it may be converted by:

$$\text{AFV m/s} = \frac{m^3/s}{\text{face area of core in } m^2}$$

COMPUTER SELECTION PROGRAM

We provide complete performance graphs for most models of our air cooled heat exchangers. However, for accurate sizing we recommend the use of our computer model selection program which covers almost all of our standard models of air cooled and water cooled exchangers. The program operates on most PC computers under Windows.

PERFORMANCE REQUIREMENTS
Shell & Tube Heat Exchanger

Company: _____ Date:_____

Address: _____ State: _____

Phone: _____ Fax: _____

Contact: _____ Ref:_____

Type of application: (Seawater / Freshwater) _____

Other: _____

Describe the circuit _____

_____

1. Heat Load (kW or Hp) _____
2. Flow rate (l/min or USGPM) Shell side: _____ Water/Tube side: _____
3. Oil type (cSt or SSU) _____
4. Desired Max. inlet fluid temp. (°C or °F) Shell side: _____ Water/Tube side: _____
5. Maximum allowable pressure drop (PSI or BAR) Shell side: _____ Water/Tube side: _____
6. Are there any circuit components which could cause sudden changes of oil flow eg cylinders or accumulators _____
7. What is the power source and how much power is needed to drive the hydraulics or the source of the heat _____

The heat load may be approximated by:
A. Hydraulic oil cooling: Assume 30% of the input horsepower.
B. Hydrostatic oil cooling: Assume 25% of the input horsepower.
C. Automatic Transmission: Assume 30% of engine horsepower.
D. Engine oil cooling: Assume 10% of engine horsepower.
The above are only to be considered as guidelines. It is the customers responsibility to provide accurate information in order to select the most appropriate sized heat exchanger.

CONVERSIONS AND USEFUL FORMULA

CONVERSIONS

TORQUE
Nm x 0.7376 = lbf ft
lbf ft x 1.356 = Nm
lb in x 0.1130 = Nm
kgm x 9.807 = Nm
kgm x 7.232 = lbf ft

POWER
kW x 1.341 = HP
HP x 0.7457 = kW
Met HP x 0.7355 = kW
Ton of Rfg x 3.517 = kW

PRESSURE
PSI x 6.89 = kPa
PSI x 0.0689 = Bar
Bar x 14.5 = PSI
inH_2O x 0.249 = kPa

VOLUME
Gal (UK) x 4.546 = Litres
Gal (US) x 3.785 = Litres
Cu Ft x 28.32 = Litres

LENGTH
Inch x 25.4 = mm
Feet x 0.3048 = metre

AREA
Sq Inch x 6.452 = Sq cm
Sq Ft x 0.0929 = Sq mtr

VELOCITY
Ft/s x 0.3048 = m/s
mph x 1.609344 = km/h
Knot UK x 1.853 = km/h

TEMPERATURE
°C x 1.8 + 32 = °F

MASS
Oz x 28.3495 = gram
lb x 0.4536 = kg
Ton UK x 1.016 = Tonne

VISCOSITY
cSt x 4.6 = SSU

OTHER
BTU/hr x 0.293 = W
Kilocalourie x 4.1868 = kJ
CFM x 0.000472 = m^3/s

POWER TORQUE AND SPEED RELATIONSHIPS US UNITS

$T = \frac{HP \times 5252}{RPM}$ $HP = \frac{T \times RPM}{5252}$ $RPM = \frac{HP \times 5252}{T}$

Where T = Torque Ft Lbs
HP = Horsepower
RPM = Revs Per Minute

POWER TORQUE AND SPEED RELATIONSHIPS ISO UNITS

$T = \frac{kW \times 9549}{RPM}$ $kW = \frac{T \times RPM}{9549}$ $RPM = \frac{kW \times 9549}{T}$

Where T = Torque Newton Metres
kW = Kilowatts
RPM = Revs Per Minute

HYDRAULIC (FLUID POWER) POWER US UNITS

$HP = \frac{PSI \times US\ GPM}{1714}$

PSI = Lbs per Sq Inch Pressure
US GPM = Gallons Per Minute US
Above is theoretical power. Add inefficiency.

HYDRAULIC (FLUID POWER) POWER ISO UNITS

$kW = \frac{Bar \times L/min}{600}$

Bar = Pressure Bar
L/min = Litres Per Minute
Above is theoretical power. Add inefficiency.

Power, Heat and Flow Relationships. ISO UNITS

$\Delta T\ °C = \frac{kW \times K}{L/min}$ $kW = \frac{L/min \times \Delta T\ °C}{K}$ $L/min = \frac{kW \times K}{\Delta T\ °C}$

Where L/min = Oil flow in Litres per minute
ΔT °C = Entering temp of oil minus exit temp of oil.
kW = Heat to be removed
K = 34.5 for Oil
K = 14.3 for Water
K factors above are typical only and will vary with density and temperature of fluid.

Heat Load Based on Temperature Rise Over Time ISO UNITS

$\text{Heat Load} = \frac{V \times Cp \times (t2-t1)}{T} = kW$

Where t1 = Initial oil temp (°C)
t2 = Final oil temp (°C)
T = Time for temp rise (seconds)
V = System oil volume (litres)
Cp = Oil heat capacity (kJ/L°C) 1.72 Typ for oil.

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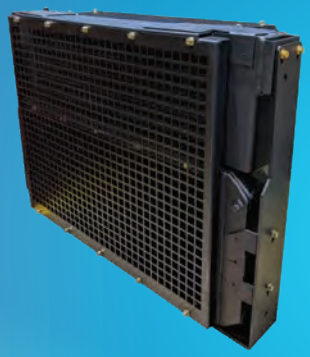
Dynacool Custom Solutions

Oil tank, motor & pump with filter used to cool oil for magnetic mineral ore separator.

Heat exchanger with separate motor & pump assembly. Fitted with thermostatic valve bypass, dual bypass filter & pressure gauge. Used for cooling oil in mine site conveyor gearbox drive.



Replacement oil cooler & water radiator assembly. Used on foundry vehicle in aluminium smelter.

Replacement 12” round floating bundle shell & tube heat exchanger. Shell in 316SS. Bundle from brass tubes with admiralty bronze tube sheets. Used on 3 stage air compressor system located at pumped hydro site.

Oil lubrication Cooling Assembly. Fitted with 2 x DC31 heat exchangers. Each heat exchanger has it’s own pump motor assembly, thermostatic valve bypass and dual bypass filter assembly. Support frame from galvanised steel. Each oil circuit is fitted with a visual oil pressure gauge and an oil pressure sensor for remote monitoring. This is in Mongolia to service two conveyor gearbox drives. Space was at a premium on the platform where the equipment was to be located. The solution was to “double stack’ all equipment into a steel frame.

LRQA CERTIFIED ISO 9001